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# Pit and Quarry

## SAND ■ GRAVEL ■ STONE

### HANDLING ■ CRUSHING ■ SCREENING ■ WASHING

#### They Chose a Kennedy Gearless Crusher

In deciding upon a crusher capable of meeting the production requirements in their new up-to-date plant at Sandusky, Ohio, the Lake Shore Stone Products Co. chose a Kennedy gearless.

Just as the performance records of Kennedy Gearless crushers convinced the Lake Shore Stone Co. of its superiority, they will also convince you.

#### Kennedy-Van Saun Mfg. & Eng. Corp.

120 BROADWAY,  
NEW YORK CITY



Write today for our crusher catalogue, showing how the greater simplicity, less power requirements and small number of wearing parts of Kennedy Gearless crusher guarantee maximum production at minimum cost.

October, 1922

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Circulation 7,000 copies

Member A. B. C.



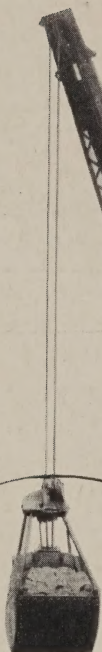
## And He Will Save Money For Many Years With This Crane

Owners of Brownhoist cranes and buckets are far-sighted buyers. They know that many years of service are built into all Brownhoist products.

Coupled with this long, continuous service is low upkeep cost. Delays on account of breakdowns are experienced less often by Brownhoist users. But when a repair part is needed it can usually be shipped at once from the huge factory stock that takes care of the many thousand Brownhoist owners.

Herman G. Luebke handles sand and gravel at his yard with this No. 2 Brownhoist gas-engine crane. He not only handles these materials at the lowest cost but makes more deliveries per day per truck and eliminates car demurrage.

Many kinds of handling work are shown in Brownhoist catalog K. *Write for a copy.*



### Clamshell Buckets

Manganese steel digging edges, annealed steel castings where there is any strain and big, bronze-bushed bearings insure long life.

### PRICES

|               |       |
|---------------|-------|
| ¾ Yard .....  | \$475 |
| 1 Yard .....  | \$500 |
| 1½ Yard ..... | \$625 |
| 2 Yard .....  | \$725 |

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THE BROWN HOISTING MACHINERY CO., CLEVELAND, O.

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

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# Pit and Quarry

Member Audit Bureau of Circulations  
A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7

CHICAGO, ILL., OCTOBER, 1922

NO. 1

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# Real Power Steer

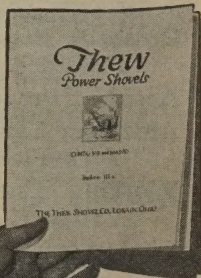
The Thew Power Steer is a real *power* steer. Many devices have been put on Continuous Tread trucks under this name but in every case it has been necessary to get down and hook up chains, levers, hose, etc. This is not necessary with the Thew.

Just a tap on a lever right at the operator's foot and everything is set. When he wants to turn a corner a slight swing of the turntable does it. The rest is automatic. The Thew doesn't have to be steered on the straight-away. The cambered treads cannot dig in or damage the pavement when turning.

The Thew continuous truck has two speeds. It is semi-flexible in construction. The heat treated cast steel treads are driven by double sprockets and are further supported by the double set of idler rollers. Since the treads do not project beyond the truck frame you can dig over either end.

This is only part of the story. Write for Bulletin 111-X.

## Thew Power Shovels



for you

THE THEW SHOVEL COMPANY  
LORAIN, OHIO





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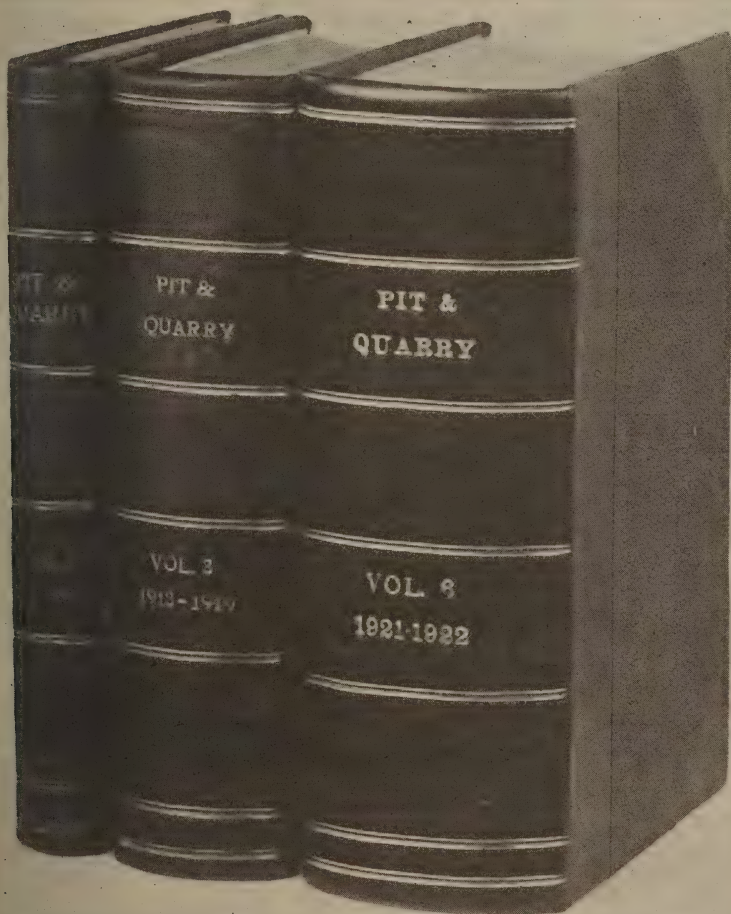
# Pit and Quarry

Vol. 7

Chicago, Ill., October, 1922

No. 1

A Growth That Speaks for Itself.



The cut shown above literally "speaks volumes." The sizes of the first, an intermediate, and the latest

yearly volume illustrate how PIT AND QUARRY grew as a direct result of the faithful service it has rendered.

Aug 5 1923 LUTHER

## Crushed Stone Plant With Unequalled Railroad Facilities

THE Lake Shore Stone Products Company, whose new quarry is located just outside Sandusky along the Clyde-Sandusky Road, appears to be well situated for the profitable production and distribution of crushed limestone. There is a fine local market at its door, and facilities for rail and water shipments are far better than the fondest hopes of many quarrymen have ever pictured.

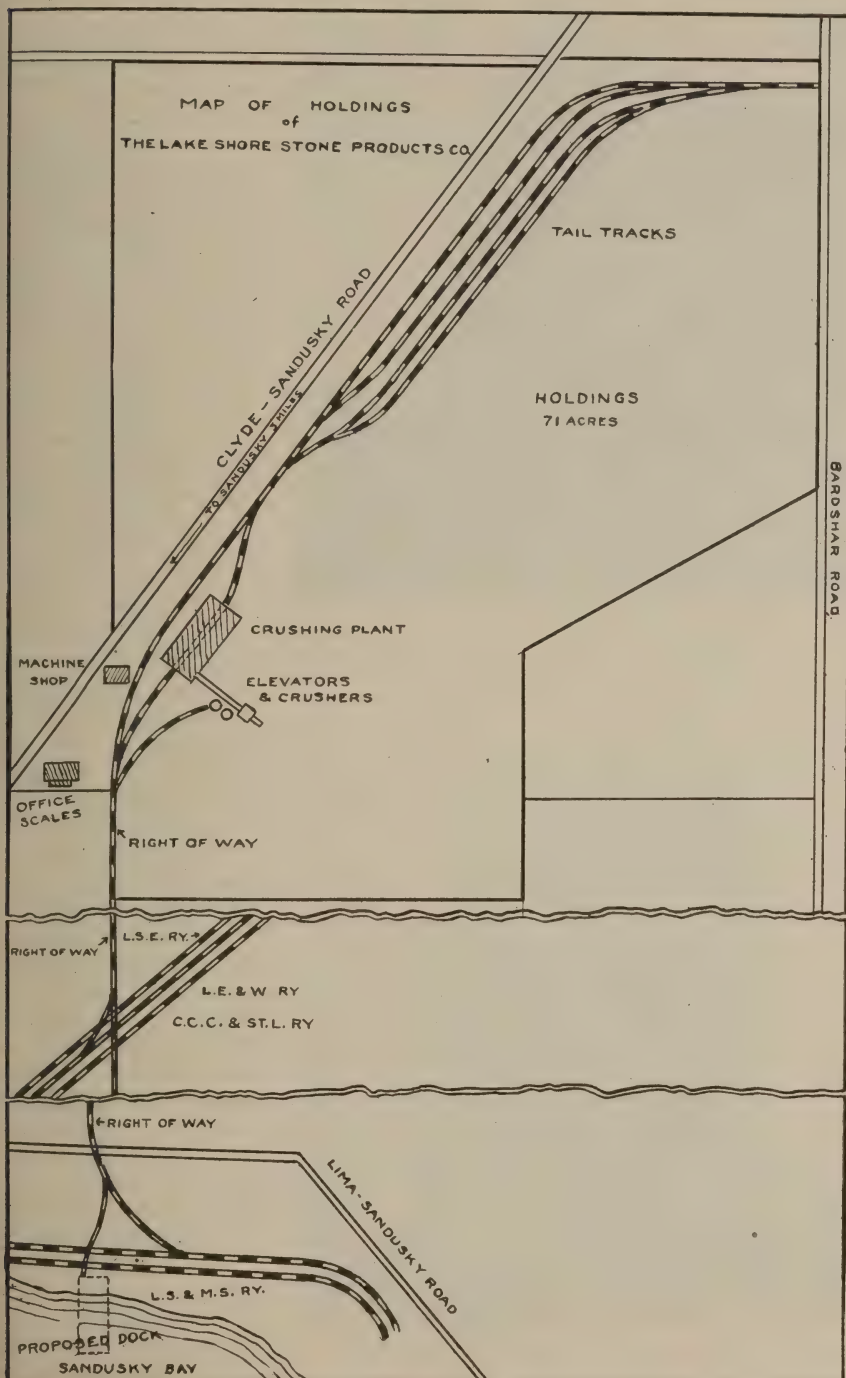
The company owns 92 acres of land and has options on 127 acres more, over all of which blue limestone of very good quality occurs in favorable condition for profitable handling. Stratification to a depth of 200 feet does not exceed 26 inches in any instance. Most of the strata are from 1 inch to 3 inches in thickness, fitting exactly one on the other without earth parting at any point. All State geological reports which touch upon the region give a very high rating to the stone, which was known to the earlier geologists as a Corniferous or Upper Hedelberg formation, but is now classified as Columbus and Delaware limestone, the latter being the top part of the formation. The pit was originally opened for railroad ballast. It shows no vertical seams of clay, and only one horizontal clay seam about five feet down from the top, which averages only an inch or two in thickness. Above this seam the roof is thinly stratified in layers an inch or two thick. The stone below is blue, hard and compact, with layers increasing in thickness to 4 or 6 inches at the present pit floor. It thus seems assured that, with development to proper working depth, the stone would be excellent for shooting on account of the absence of very thick strata.

The property owned by the Lake Shore Stone Products Company was originally taken over about forty years ago by Chauncey M. Depew, the Vanderbilt family and their associates. It was operated for a number of years and the product used by the Lake Shore and Michigan Southern Railroad for making a fill for several miles across Sandusky Bay. In order to facilitate transportation at the time this ballast was taken out, the original owners built a standard gauge railroad of  $2\frac{1}{2}$  miles from the quarry to the shore of Lake Erie. This right-of-way, which became the property of the Lake Shore Stone Products Company when it acquired title to the quarry site, now crosses three other railroads. By means of this right-of-way and other connections the company possesses all the shipping facilities offered by the New York Central, Lake Erie & Western, Big Four, Baltimore & Ohio, Pennsylvania and Lake Shore Electric Railroads. In addition to this it has at its door the cheapest and most efficient of all local shipping facilities—Lake Erie. One of the future developments planned by the company is the building of a dock at the end of its right-of-way on Sandusky Bay. The right-of-way may also be used at some future time by the company as a belt line between all the roads it crosses. The operation of such a road should be very profitable.

The general elevation of the ground surface is about 50 feet above lake level, and surface drainage is negligible because of the lay of the contours. No appreciable amount of water was found at the 8-acre pit, although it had not been pumped out for years. The pitch of the strata should afford cheap pumping when the



MAP OF HOLDINGS  
of  
THE LAKE SHORE STONE PRODUCTS CO.





View of Plant from Clyde-Sandusky Road



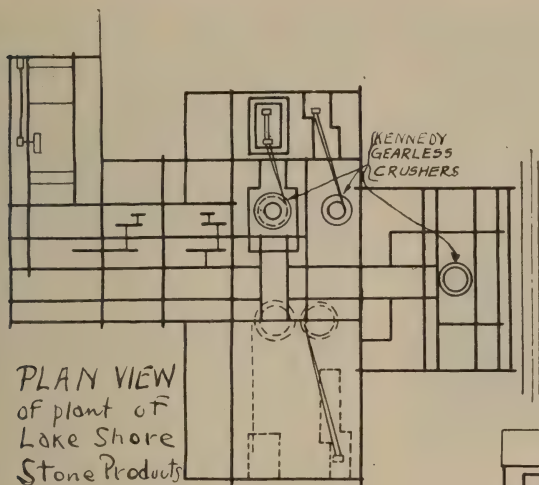
View of Plant from Quarry Side. Still Under Construction

quarry is sunk to a workable depth, as pumping facilities can be installed on the lake-ward side, and the fall of the surface drainage along the right-of-way to the lake is ample.

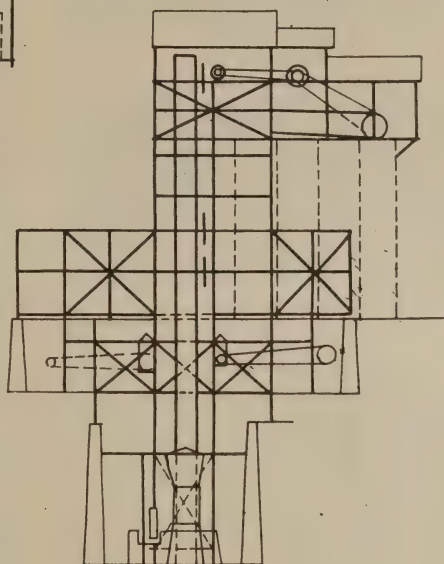
The site requires but little earth stripping. The area has been scoured by the glaciers of past ages, which have scraped the rock surface nearly clean, leaving approximately only 6 to 10 inches of dirt. For the present, the 8 acres already stripped afford practically clean stone without any stripping, and will give an excellent working face when the pit is deepened, as the stone appears to be of fine quality and in layers of a size for blasting most cheaply. The blue limestone runs down to a depth of 22 feet, below which is a seam of fluxing stone. When under way, it is the intention of the company to work the quarry for both kinds of stone. There is enough material to keep the plant in operation at a capacity of 2,500 tons per day for sixty years, after which an additional 50 foot lift will be taken up. The operators expect to find it a fast and drill and shoot.

Analysis of the stone shows that it exceeds all requirements of the

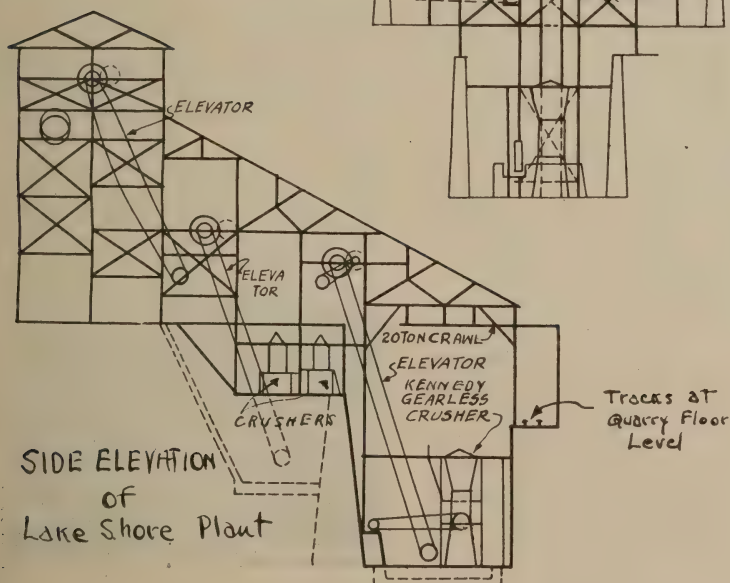




PLAN VIEW  
of plant of  
Lake Shore  
Stone Products  
Company



END ELEVATION  
of  
Lake Shore Plant



SIDE ELEVATION  
of  
Lake Shore Plant



Blast Hole Drilling is Done by a Clipper Drill

State Highway specifications. It measures up to every demand for railroad ballast, road and construction work. Its chemical composition is as follows:

Silica ..... 4.6 per cent  
Iron and Aluminum Ox-

ides ..... 1.2 per cent  
Magnesium Carbonate...15.3 per cent

Calcium Carbonate.....79.6 per cent

It has a French coefficient of 8.2 per cent, hardness of 19 per cent and a toughness of 11 per cent. The per cent of wear is 4.1.

At the present time the company is working a Clipper drill, boring holes for the charges that will work out a deeper quarry floor. The blasted material is picked up by a No. 36 Marion steam shovel and carried to the four crushers now in operation. While the extensive construction work is going on, these four crushers are providing the plant with an income and helping to defray part of the expense. Hercules dynamite and Cordau-Bickford detonating fuses are used in the blasting operations.

One of the best features of the new plant will be the location of the primary breaking machine, a No. 30 Kennedy-Van Saun, gearless crusher. This crusher will be located in a pit

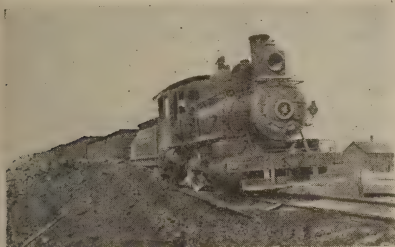
extending 34 feet below the new quarry floor level. The building of this pit is just about accomplished. It has been blasted out of solid rock, the excavated material being put through the crushing plant that is now being operated and sold as crushed stone, thus helping to defray a considerable part of the cost of hewing out the pit. The idea of this expensive feature of the new plant is that it will do away with the necessity of elevating the quarry cars. Loads of stone will be dropped from side-dumping cars and go through the big crusher, directly to the boot of the No. 1 bucket elevator. The inside dimensions of the top of the pit will, when work is completed, be 44x30 feet. The Kennedy crusher will, by means of this mounting in a pit, be given a solid bed rock foundation and will be in a very accessible position for repairs and replacements. Above the spider of the crusher will be located air hoists for handling very large stones that may bridge on the spider, and to take care of the work of tipping quarry cars.

In the quarry, stone will be loaded by a No. 36 Marion steam shovel and by equipment to be added later into  $4\frac{1}{2}$  cubic yard cars, designed by Mr.



Quarry Cars are Loaded by a Marion No. 36 Steam Shovel





Company has its own standard gauge switch engine.

E. B. Nichols, superintendent of the plant. Mr. Nichols has been working for some time on the development of new ideas in quarry cars and expects to find the equipment now being made on the ground at the plant very satisfactory. These cars are hinged on the open side at three points. The method of tipping will be to attach a hook from an air or drum hoist to the Langle-iron supporting the car bottom. The edges of all the quarry cars that Mr. Nichols is building are bound with old quarry rail which should add materially to their life.

Haulage in the quarry is being taken care of by an 18-ton Davenport locomotive, an 18-ton Porter locomotive and two Whitcomb 7-ton gasoline locomotives, all narrow gauge.

As soon as the cars are brought up to the plant they will be dumped as already described and the stone fed to the large Kennedy crusher. After passing through this machine they will drop to the boot of a No. 1 bucket elevator which is 73 feet between centers. This elevator will deposit its



Part of the haulage is done by Whitcomb gasoline locomotives.

load on a shaking grizzly, manufactured by the Kennedy-Van Saun Engineering Corporation. Oversize dropped out at this point, will be passed on to a No. 49 Kennedy-Van Saun gearless crusher, and undersize to a No. 37 Kennedy gearless crusher. A No. 6 Austin crusher and a No. 4 Austin crusher will be used to effect further reductions in stone sizes. These crushers discharge into a concrete pit extending down 19 feet, at the bottom of which is the boot of a No. 2 bucket elevator, 62 feet between centers. This will in turn, pass the product on to a No. 3 elevator which is also 62 feet between centers, and



The No. 30 Kennedy gearless crusher is not yet assembled.

which terminates at a hopper above a large rotary screen. Republic belting is used for elevating material, and for transmission throughout the plant.

The screen over all is 38 feet by 8½ inches long, with a screening surface of 30 feet, and has a diameter of 84 inches. The stone will be dropped from this large screen to rock bins below, which are laid out to accommodate all the commercial sizes and a variety of mixes, which are made by spouting the products of various sections of the screen into the same bin. Car loading is done either from below the bins or at the side. The overhead loading is through clam shell bin gates supplied by Kennedy-Van Saun, and side loading through spouts designed by Mr. Nichols.

Except for the quarry equipment,

(Continued on page 89)

# Accident Prevention in the Cement Industry

A Paper Given Before the National Safety Congress

By H. S. JACOBSEN

Manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, Chicago

THE first time the cement industry heard of accident-prevention work was in 1911 at our semi-annual meeting in Kansas City. Mr. Nicholson, now president of the National Cement Company, brought the subject before the meeting, saying that inasmuch as a good many States were working on compensation laws it would be to the advantage of the industry to look into the matter and see if it would not be possible to prevent a good many accidents, thereby getting a reasonable amount of accident prevention and insurance work started within the Portland Cement Association. Mr. J. B. Lober, president of the Vulcanite Portland Cement Company, was the first chairman of the Accident Prevention and Insurance Committee, the position which Mr. Tagge now holds.

At the next meeting of the association papers were presented on accident prevention and insurance. For several years things went along very quietly. There were reports at the regular meetings of the association, but no real data to show whether progress was being made or not. It then was decided to get a real picture of conditions, that it would be necessary to gather reports of all accidents which happened at the various plants and study them in order to prepare statistics which would show the progress being made in the work.

The first study of accidents was for 1913 and it was weak in a good many places. For some reason we had an uphill fight all the time in getting accidents reported. We were told by men in charge that they had few ac-

cidents of any consequence—an accident at that time meant a man killed or an arm torn off—"something of that kind; anything less than that did not count. I had a terrible time securing reports. I remember one company in particular: They sent in reports of only a few accidents, so I wrote asking if that was all the accidents they had had during the year. They answered "Yes, that was all they had." I wrote again and again and finally I got their report. It showed they had lost about 800 days' time. Undoubtedly there were a lot of such cases and it took several years to get all of our companies to report their accidents.

The first studies of accident figures were compared on a basis of production—so many million barrels produced and so many accidents. That system was misleading, inasmuch as one plant is more efficient than another, not only from a labor standpoint but as to equipment, and one plant might produce a million barrels with considerably less labor than another plant; for that reason the comparative method struck us as being unfair. Then we commenced to compare statistics on the basis of men working at a plant, but that was found to be unsatisfactory, too, inasmuch as some men worked on a two-shift and others on a three-shift basis. Finally we reached the point where we decided to compare all our statistics on the basis of actual man-hours, for it does not make a great difference whether a man works eight, ten or twelve hours. That is the basis we are using now. It is rather difficult to go back as far as 1913 to see just



what progress we have made, because we have not some basis of comparison for all of those years—we have the figures only for 1918.

In looking over those studies for the last four years we find that we have a very healthy condition. We are not prepared to say that we have decreased our accident 75 or 90 per cent or anything like that, but I grant you a normal decrease. I would rather see it that way than something abnormal, which we could not keep up; we are working right along and in years to come we are sure to show improvement.

The past is gone and we cannot do anything about it, but we can do a lot for the present and the future. I visit different plants and get an insight into a lot of things that are lost to a good many people, even those in the industries. I have visited all our plants from coast to coast, from North to South, and know practically all the people—the superintendents and a good many of the foremen, the executives and so forth—and there is no secret as far as I am concerned about the work. I can put my finger on practically any plant and say how many accidents, within a reasonable degree, they will have next year, as it will vary only a few points one way or the other.

I was formerly an insurance man and in that business they talk about the "physical" and "moral" hazard. What is a "moral" hazard? It is not morality, such as the ordinary person thinks of. By "moral" hazard we understand the human element in connection with the risk; the human element is not only the employee, but also the employer, and possibly more the employer than the employee. There is no one in the cement industry who is not anxious to see accidents reduced, but possibly with some it is a passive rather than an active interest.

It is wonderful to see what a plant can do if there is the co-operation of everyone from the top to the bottom. I have seen plants that an insurance man would not shake a stick at because he would be afraid of them. I have seen plants, perfectly guarded from top to bottom for years, still having accidents, not on account of any mechanical condition, but because of the human element which enters into everything at that particular plant; not only in faulty work but in operation, family questions, community questions, etc.

We have found the same thing in all our no-accident months—I don't know of a single one that has not come up to the scratch. Last year, when we started these campaigns, we were a little in doubt about how to go about it. We decided that advertising, taking the proposition to the men, was the thing, and not to lay too much stress on mechanical questions. We have varied our methods at different plants, but we have got wonderful results, some almost unbelievable. If this can be done for one month, why not for twelve months and why not forever? There is only one reason I know of and that is that after a time enthusiasm commences to lag a little, everybody commences to slip, and accidents show up unless one is always on the job with new ideas and new plans.

I believe that next year's study of accidents, which will be for 1922, will show a very material improvement over 1921, which was an improvement on 1920. This was only possible because we are now able to get the active interest of executives and superintendents and other men who are leaders in industry.

We have held our district safety meetings in St. Louis, Allentown and Albany and are drawing quite a few cement people to those meetings; it is very encouraging to see our people

warm up to the proposition. I look forward to seeing our figures for the future better than they are now; even if they are getting better they are not so very good—we have nothing to be particularly proud of. The fact that last year we had fifty men killed in a working force of about 30,000 is nothing to brag about. The Ford plant, with 40,000 people, did not have a single fatal accident in a year and the International Harvester Company, with 30,000 people, had only one man killed in twelve months—this shows us that we have far to go!

Our fatal accidents are largely due to the peculiar nature of our industry and it is hard to say just what we can do to prevent them. During the last three or four months we have had a string of most peculiar fatal accidents—men being electrocuted on 110-volt lines removing light bulbs, and things like that. You cannot prevent such accidents by means of guards. Only through a continuous campaign of education, I suppose, will we come to a point where we can get all of our men to think in terms of safety, so they will see danger in practically everything, and stop and think before they act.

So far as I am personally concerned, I am not bothered about the problem of safety, because I really do not see much of a problem in it. A man is just as safe as he wants to be, and no more, and a plant is just as safe as it wants to be; it entirely depends on the standard they set for themselves. If we were satisfied, as we were years ago, with a record of having a couple of men killed every year, you can be assured that you are going to have just that many men killed, on an average, every year. On the other hand, if you say to yourself that you are going to cut out the accidents, you are going to do it some time; it may take time, but you are going to do it.

One thing has impressed me quite forcibly lately, a lack of discipline in connection with safety—possibly it has more to do with our condition than we think, this lack of discipline. If a rule is issued not to do this, that or the other thing, and if that rule is violated, something must be done about it. A rule that is not enforced is a bad thing.

During a no-accident campaign at one of our plants they had only one accident; one of the foremen stepped on a nail and did not report it. He lost thirty days through blood poisoning. If one of the foremen does a thing like that what can you expect of the men? Because a man has been with us a good many years sometimes it is difficult to penalize him, but there ought to be a way by which the men can be impressed with the fact if it is a rule to report all accidents as soon as they happen that that rule must be lived up to.

Housekeeping and plant conditions have much to do with accident prevention. It is a pleasure to go to some of the plants and see the flowers and the grass and everything kept in good shape. That impresses the men favorably and removes a lot of hazard; it is efficient in itself because the men go about their work in the way they should.

We have all had our troubles with safety committees and in discussing the problem today it seems as if we are still in doubt as to what such a committee should be and the work it should do. I have attended a good many safety committee meetings at cement plants all over the country; some of them have been excellent, but others have not been so good. In so far as the committee is concerned I believe we have used a wrong term when we call it a safety committee. The committee should always be composed of men who know more about that particular problem than anyone

else—that is why the committee is formed, to gather information to be later distributed to the rest of the people in the organization. The idea of the safety committee of years ago was for a group of men to endeavor to find all the dangerous places in the plant and to suggest remedies.

If the recommendations offered by the men were not carried out the work lagged and died. As far as guarding is concerned, I do not believe it is necessary to ask a committee to tell you what to do about your plant in a mechanical way. It is the superintendent's and the foreman's duty to have the plant in such shape that no workman can find a reasonable fault with it. In a few cases workmen will be able to suggest new guards, even in a well regulated plant, but not often. I would rather have the committees referred to as safety schools or something to that effect, and instead of asking the men to tell you what to do I would rather have you tell them what they should do. Educate them and tell them how accidents happen, not only at your plant but at other plants. For instance, in the last year and a half we have had eleven electrocutions. What do you think of that, eleven electrocutions? They were not all due to carelessness; ignorance played a part for the reason that a good many people have not the slightest idea of what electricity really is. They know that when they push in a switch the motor starts to run, but that is as far as they go. To such a thing as an ordinary light bulb they do not give the slightest attention; that is not only true of workmen but holds good generally. Anything less than 440 volts is not considered hazardous but every year people are killed with 110 volts in bathtubs, laundries, and in other places where there is a good ground—it is just as bad as if they were struck by 3,000 volts.

We make a mistake in not keeping our employees posted on what is going on. Ask one of them, a foreman if you like, how many accidents occurred in the plant last year and how many days' time was lost. I will guarantee that you will receive few correct replies. You cannot expect much interest unless you give them all the data available—the more you put on the bulletin board the better. Keep your men posted on what occurs in their own plant, that always interests them more than the doing somewhere else. Tell them how many accidents they had last year, how many each month this year. They should have this information and it is surprising how little of it is broadcasted among the employees.

Information of this nature leads to educational work in which we are all deeply interested. It also serves to develop latent talent in the plant and to bring forward the men we are anxious to interest in safety work. In one of our plants we have an expert showcard and bulletin writer. His bulletins are splendid and he has also built up a safety museum out of old tools and odd things he has picked up about the plant.

In so far as our work in the future is concerned and the results we can expect, this will depend entirely on the work that we do and the enthusiasm that we show at this time. We are going to get out of this activity just what we put into it. We must give the work our constant attention, because new employees come into our plants practically every day; in the course of a year some companies have a labor turnover of about 100 per cent or even more. That does not mean a change of the whole personnel, the turnover may take place in possibly only 25 per cent of the force, but those men are liable to get hurt, and it is up to the men in the plant to tell the newcomers what is expected of them.



# American Cement Plaster Co. Operates Modern New York Plant

Manufactures Line of Finished Products  
From Gypsum Rock of the Akron "Basin"

ONE of the largest operations in the gypsum fields of Western New York, is that of the American Cement Plaster Company, which operates other plants at Gypsum, Ohio; Grand Rapids, Michigan; Fort Dodge, Iowa; Blue Rapids, Kansas; and Agatite, Texas.

The Akron gypsum "basin," as it is locally termed, is situated northeast of the village of Akron, some twenty miles east of Buffalo. The productive area lies south of the Lake Shore Railroad, to which connections are made by long switches. The basin is some two miles long with a maximum width of one mile. The deposit is pear shaped and it is at the small end that the American Cement Plaster Company's shaft is sunk. The bed of gypsum, as mined, consists of a 4 to 5 foot bed of light colored crystalline or granular gypsum, overlaid by 25 to 50 feet of thinly bedded impure limestone. These, in turn, are rather heavily covered by a mantle of glacial clay ranging from a few feet up to 25 feet in thickness.

The company's mine and shaft are situated one mile northeast of Akron on the Bloomingdale road, with the mine shaft southeast of the mill, and connected with it by an extension of the narrow gauge railroad up which loaded cars from the workings are pulled by hoist. The mine is entered by a two-compartment shaft, 86 feet in depth. A main gangway extends back about  $\frac{3}{4}$  miles in a straight line. Up this main gangway are radiating gangways which are laid out so as to get the most from the fan-shaped deposit that is being worked. Pillars

about 10 feet thick are left every 30 feet apart.

The gypsum bed as mined, ranges from  $2\frac{1}{2}$  to 5 feet in thickness, with a thickness in most places of about  $3\frac{1}{2}$  feet. The mine is quite a wet one at times, although the flow of water has been greatly reduced since the time the workings were first opened, when 4,000 gallons of water a minute were pumped from the shaft. No forced ventilation is employed, a small airway at the east side of the shaft giving sufficient air.

Drilling is done by 16 Scranton rock drills. The shots are made each night in holes made by drill runners during the day, while the product of the former night's blast is being loaded. When unusually large stones, too big for sledging, are encountered, they are broken by air hammers operating from compressors mounted on the running gear of mine cars, deriving their power from extensions of the trolley line used for haulage in the main gangway.

Material is loaded by hand on steel cars of 2 tons capacity each, which are drawn by one of the company's two Mancha Mules to the main gangway where trains are made up by the trolley locomotive that brings the cars to the foot of an inclined gravity track leading into the mine. Cars are hauled up this track by cable for a distance of 120 feet. This cable haul is handled by a special 2-drum hoist, belted to a Western Electric, 25 H.P., 2-phase motor. This hoist is located at the bottom of the crusher house, one drum on either side of the bucket

elevator which takes the material from the crusher.

Provisions made for handling mine cars at the tipple are rather better than one usually sees around a crushing plant. At the tipple end of each of the tracks of the mine, is located a small automatic weighing hopper with a capacity of, say, 5 tons. A gate at the side of each of these small hoppers lets the stone drop to a No. 8 Tel-smith crusher, around which is built a large steel apron.

After the stone has passed through the crusher it goes to the boot of a chain bucket elevator, running directly under the crusher, and is elevated to the ground level, a distance of some 25 feet.

The crushed stone, after its discharge at ground level by the first conveyor, is picked up by a second chain bucket elevator and raised to the top of two steel storage bins, shown in one of the accompanying illustrations. These storage bins serve the purpose of keeping the mine and mill balanced, by preventing increased or diminished activity at either of the two points, from immediately or at all, reflecting itself in the other. This same purpose is accomplished by a large open stock pile located to the side of the steel bins, and served by a belt conveyor running overhead on a trestle, and equipped with a tripping device for setting down the material at any point along the length of the stock pile that is required. A view of this tripping device is shown in one of the photographs. It consists essentially of an arrangement of pulleys and a V-shaped scraper whereby the belt is made to discharge its contents at either side of the belt into spouts at either side of the belt. Flow to the spouts is determined by the position of a flop-valve. The flow of material to the belt conveyor running the length of the trestle, and the flow

into the two storage bins is also determined by a system of flop-valves. The trestle belt conveyor is driven by a motor at the tail end of the conveyor. Some 10 feet away from the storage bins is located an idler, for securing proper tension on the conveyor belt. The tripping device described above, rests on car wheels which run along a track the length of the trestle, and may be set at any particular point. The foundations of the steel bins and stock piles are concrete, as is also the structure below, through which runs the tunnel belt conveyor that takes material from the stock piles or bins to the dryer.

This tunnel belt conveyor draws off material in the stock pile and bins through gates located every few feet apart, and through which the stone drops from the stock pile or bins. No provision appears to have been made to cause the flow of crushed stone in the stock pile towards these gates after the material has assumed its natural angle of repose.

The mill end of this tunnel belt conveyor is elevated sufficiently to bring the stone to the charging end of a Ruggles-Coles rotary dryer. This dryer is powered by a General Electric motor, and a Buffalo Forge Company blower is used to draw the hot gases through the dryer, and remove the natural moisture from the mines and the moisture acquired at the stock piles. After the stone has progressed through the dryer, it drops out at the bottom of a vertical elevator, which raises the material to a pan conveyor running across the railroad track, to the grinding building.

The stone coming over to the grinding building in the pan conveyor is dropped by chute to a Jeffrey hammer mill, from where, after reduction, it drops again by chute to a vertical elevator. This elevator discharges at large steel bins from which are fed

by gravity two Raymond mills and six French burrstones. The burrstones are used as auxiliary equipment to supplement the Raymond mills, or to substitute for them in case of breakdowns.

The product of the Raymond mills is passed by blower to the kettle bins above the four kettles, used for calcination. The product of these kettles drops to a screw conveyor which also feeds through an elevator to the four kettle bins. The product of the kettles is picked up by a screw conveyor running along a trough paralleling the kettles, and which is fed by spouts running down from the kettles. This screw conveyor discharges at a vertical elevator which passes through chutes to screw conveyors running into bins above three Broughton mixers.

At the top of the vertical elevator feeding the screw conveyors to the mixer bins, is a screw conveyor which passes its product to a hopper above a large trestle running across to the board plant. Thus a continuous kettle stream is being sent forward for board making purposes. The conveyor to the board plant illustrated in a number of the photographs is of the disc and cable type.

In the upper sections of the Broughton mixers, gypsum is weighted out in large cones suspended by chains on the beam of the scale. To the gypsum thus measured out accurately into batches is added the amount of retarder required for the particular set demanded by the lot going through at the time. At this point also, the wood fibre or hair is added. The company manufactures its own supply of wood fibre, obtaining the wood, mostly poplar wood and basswood, from the neighboring farmers and shredding it to the right size with their own machines. The hair used is washed goats hair, purchased in bales.

Provision is made for drawing off plain stucco unmixed with hair or fibre or retarder, and also for drawing off land plaster which may be sent direct to the cars as it comes from the mines in the raw state.

At the bottom of one of a battery of Bates valve bag packers is a slat conveyor on which the packers, after filling the bags, immediately throw the complete packages. This slat conveyor passes the bags to a point where they are easily taken off and piled 7 or 8 high on hand trucks for easy loading into box cars.

The company's board plant is designed along strictly modern lines, and the methods used for combining the plaster and rolls of paper are quite impressive. After the continuous sheets of wall board come to a point where they are cut to size, the cut boards are passed mechanically to two men who transfer them by a cradle to piles beside drying racks which run on overhead tracks into a dryer. After the plaster in the boards is fully dried, the boards are taken out and passed to a storage warehouse, from which they are loaded into box cars.

In connection with the American Cement Plaster Company's plant at Akron, is also a block plant, operated by the Structural Gypsum Company. Here gypsum purchased from the American Cement Plaster Co. is made into building blocks by modern moulding machinery. A number of the photographs showing large quantities of these blocks drying in the drying yard will give an idea of the activity of this concern.

Between these two enterprises a considerable amount of material is turned into finished products right on the ground. This manufactured material is all ready for application in various ways without further processing and the danger of improper later handling is thus minimized.





View of the Grinding and Calcining Plant from the North

The plaster plant has a capacity of 750 tons of plaster for each 24 hours operation. This amount includes many different mixes, all of which are carefully analyzed and checked up in the company's complete laboratory located in a building close by the

rives on the job. The varying and uncertain conditions which surround the ultimate use of the material make it easy to understand why the company is so particular about this part of its work. The chemical analyses are made at Buffalo and other points.



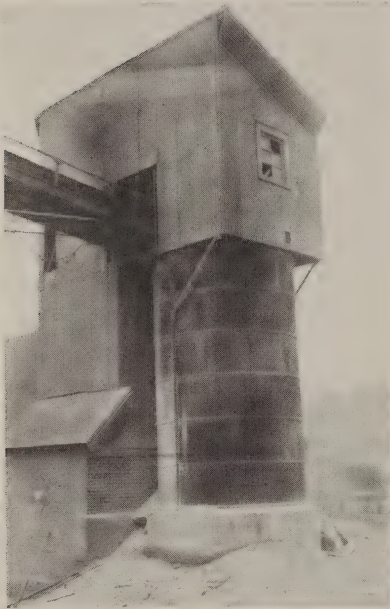
Rotary Dryer Building Connected with Bins by Tunnel Belt Conveyor

mine. In this laboratory are performed all the mechanical tests necessary to insure the production of the highest grade materials, which will give perfect satisfaction when it ar-

The plant is operated entirely by electricity. Power from Niagara Falls is taken in at high voltage and transformed down to 440 volts. A certain amount is converted into direct cur-



Quarters for Employees are Located Close to the Mill and Mine



One of the Steel Bins for Special Finished Products

rent for use on the trolley system in the mines, and for the Scranton rock drills.

In connection with its plant at Akron, the company maintains quarters for a considerable number of its employees. These quarters, as shown by one of the photographs, form in themselves a sizable little community, and, besides furnishing good housing for employees and their families, keep the workmen closer to the plant

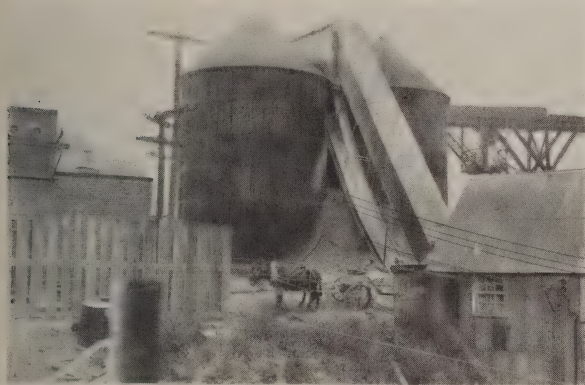


Tripper on Belt Conveyor to Stock Pile



View of Board Plant of Block Plant of Structural Gypsum Company





Crushed Rock is Carried by Bucket Elevator to Storage Bins and Stock Pile



Mine Entrance and Trackway to Crusher House



Stock Pile and Storage Bins Keep Mine and Mill Operations Balanced

After the stone has passed through the crusher it goes to the boot of a chain bucket elevator, running directly under the crusher, and is elevated to the ground level, a distance of some 25 feet. It is then picked up by a second elevator and raised to the top of two steel storage bins.

Cars are hauled up this track by cable for a distance of 120 feet. This cable haul is handled by a special two drum hoist, which is located at the bottom of the crusher house, one drum on either side of the bucket elevator which takes the material from the crusher.

These storage bins serve the purpose of keeping the mine and mill balanced by presenting increased or diminished activity at either of the two points from immediately or at all reflecting itself in the other. This same purpose is accomplished by a large open stock pile located to the side.



# PLYMOUTH

*Gasoline Locomotives*

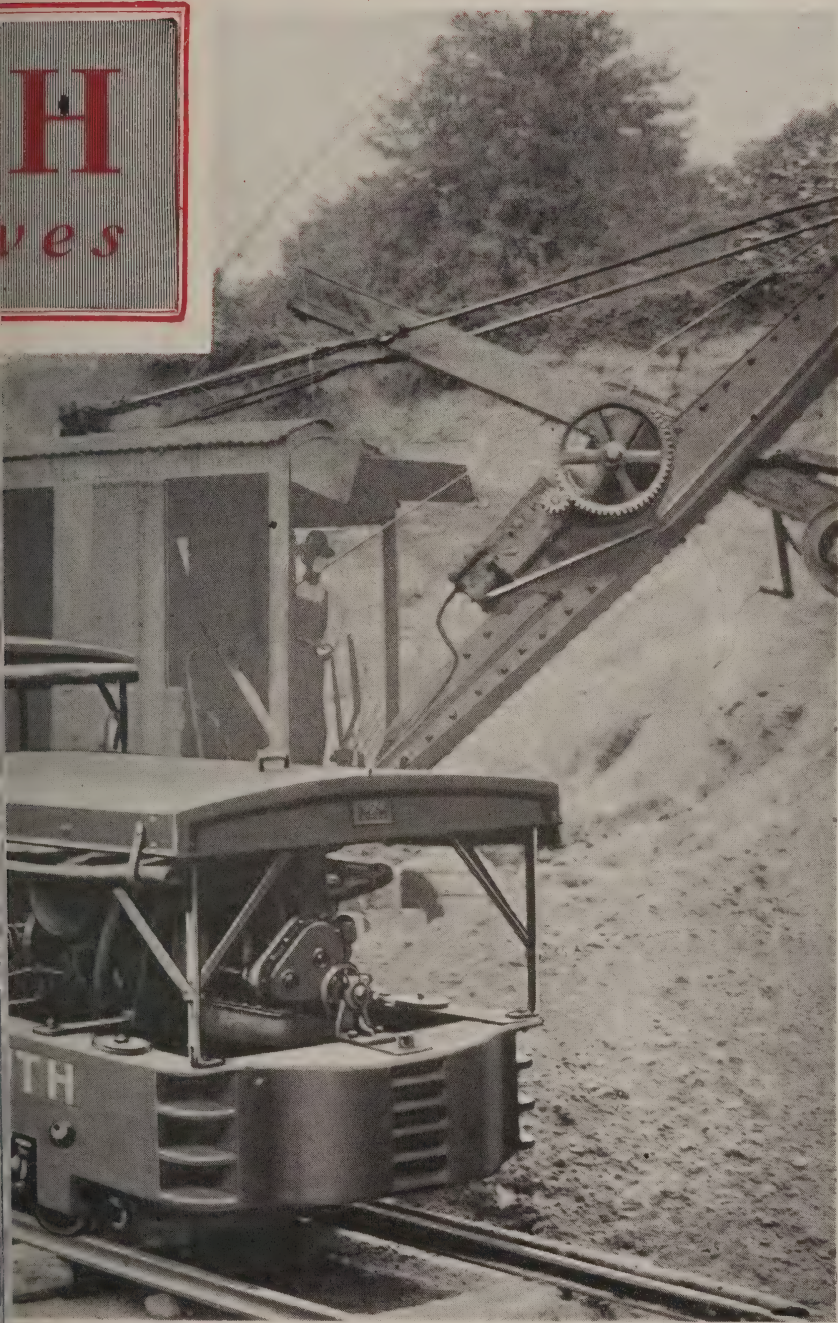


## 21 PLYMOUTH LOCOMOTIVES

are now used by the Morris County Crushed Stone Co. and its Associated Companies operated by F. W. Schmidt, Morristown, N. J. Ask for Bulletins.

The FATE-ROOT-HEATH CO., Plymouth, O.

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ves







General View of Plant of Crescent Silica Company at Ottawa, Ill.

## Working Fine Silica Sand Deposit in Illinois River Valley

A COMPARATIVELY recent addition to the group of silica sand plants in the Ottawa district in Illinois is the plant of the Crescent Silica Co., located some five miles out of the town. This company controls a deposit of about 150 acres, over most of which lies some very fine material. The high silica content of the sand on the property makes it very desirable for glass making, and its sharpness and other desirable qualities causes it to find easy sale for sand blast purposes.

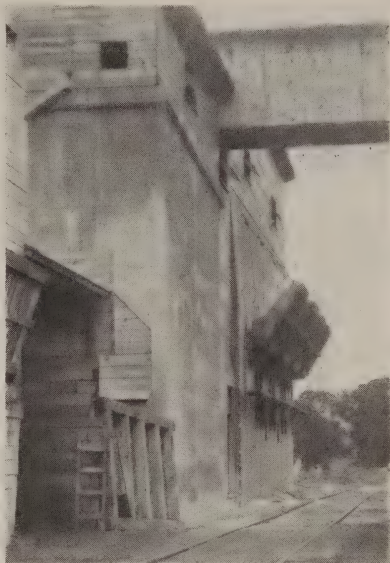
Throughout the property the harder and less desirable material is found in high strata, and the better and looser sand is further down. Very little waste material is encountered and the amount of spalls, niggerheads, and other culled matter is quite small. All parts of the property show an amount of iron and aluminum associated with the silica.

The material is obtained by open face methods. The silica occurs under a very light overburden, and, as already stated, improves in quality as continuous excavation deepens the workings. One part of the pit, that point at which sand of the best quality is pumped out, is quite a way below the level of the Illinois River, and seepage from the river about  $\frac{1}{2}$  mile away keeps entering the pit and necessitates the continuous operation of drainage pumps. A year or so ago the company was using the single pump for draining the pit of water, and had a very disagreeable experience when this equipment gave out. The workings were flooded and it took weeks of work to get the water down to a point where it was possible to start operations again. Pumps are now operated in duplicate and it is quite unlikely that a flood will occur again. A Worthington and a Gordon



steam pump are employed for this purpose, either one sufficient to do the work and both available for use if any unusual conditions arise.

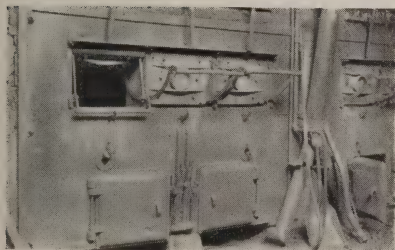
Two kinds of material are produced from this pit, a pit run silica sand and a washed and dried product. The pit run sand is secured by a drag scraper, and the sand intended for washing and drying by steam pumps at the lowest point in the pit, as illustrated in one of the photographs. An occasional blast brings down sufficient loose material from a 75 foot face for removal by either process. Drilling is horizontal. A comparatively light blast brings down large quantities of material, for the sand is not very tightly cemented. The discharge of the drainage pumps is used to wash down the sand loosened by blasting.



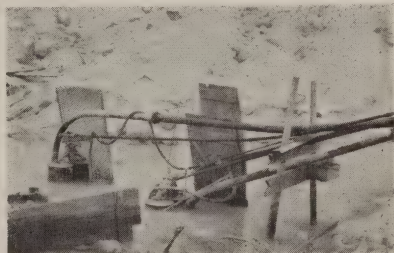
Moving Cars are Loaded from the Drain Bins Through Wide Spouts



Sand is Removed from the Washers by 2 No. 5 Nye Steam Pumps



Boilers are Equipped with "Kicker" Doors



Finer Silica is Excavated by Steam Pumps



Reservoir for Water for Boilers and for the Sand Pumping Operation

The securing of the pit run material is quite a simple operation. A Le Claire scraper, operated by a two drum hoist, brings the material up to the bottom of a long belt conveyor running directly above cars, into which the material is dropped without going through bins. At the time that

ings and one to the track. This was necessary to avoid disturbing an existing arrangement that was satisfactory at that time. Later developments planned by the company include a change in this method of excavating pit run material. When the change is made the conveyor belt



Crude Sand is Excavated by Scraper. Finer Material by Steam Pumps

the company's new plant, here illustrated and described, was built it was necessary to permit this conveyor belting and the gallery in which it runs, to pass through one of the build-

running through the building will be removed and the opening through which it enters the building sealed up.

The securing of sand for the washing and drying operations is rather a



more complicated operation. The material is taken up first by two Nye pumps which discharge against a 30 foot head at the boot of a cleat elevator about 75 feet long between centers and running to the top of the washing plant. This elevator discharges at a rotary screen which scalps out rocks and niggerheads and passes to large 100 ton washers. These washers are really nothing more than square wooden bins, each of which has an adjustable spillway in one corner over which runs the water that has, by its movement through the sand, washed out the impurities. The adjustable spillgate consists of a series of small boards of uniform length which are built up one on the other in steel grooves.

From these washers the sand is picked up by two No. 5 Nye pumps, here illustrated, and sent to drain bins on the north side of the building. There are sixteen of these bins about 100 tons capacity each. These are also fitted with the same type of adjustable spillway as the wash bins.

After drying, the material is taken off at the bottom and passed to a 24-inch tunnel belt conveyor which is set, by a transmission cone, to run at the speed that is required by the dryers. The reason for providing for variable speed in this belt lies in the fact that there is considerable variation in the moisture content of the batches of sand. If the sand is wet, it is kept in the dryers for a greater length of time and the dryer is operated under higher steam pressure. Under more favorable conditions the dryer may carry 40 to 50 pounds of steam and operate more rapidly. These dryers were made by the Louisville Drying Machine Company of Louisville, Kentucky. They are powered by 45 h.p. motors each. The principle on which they are operated requires the passing of steam through a large number of flues running the

full length of the dryer. As the dryer keeps turning over the sand is continually falling through the spaces between these flues and is quite effectively dried. Each dryer has a capacity of 25 to 30 tons per hour.

The method of filling these drain bins is one of the features of the plant. The discharge line from the Nye pumps has a flexible section at the point where it enters the floor from which the washer bins are filled. At the pump side of this flexible section the discharge line is stationary. The other side of the flexible section is a continuation of the discharge line some 15 feet long terminating in a section of pipe pointing downward and connected to the discharge line at right angles. The overhead track system permits the swinging of this discharge line over any pair of bins, to which the line is clamped. When one set of bins is filled, it is a comparatively easy matter to swing the discharge line to another point from which it will fill one of two other bins, depending upon the position of a flop gate which is set on the wall between the two bins.

The sand from the dryers is discharged on an 18-inch belt conveyor which feeds to a bucket elevator running to dry sand bins of 150 tons capacity each.

At the present time the company is doing no grinding. It contemplates the building of a grinding plant in the near future. They are now selling only one grade of the washed product, in which all the natural grain sizes are mixed. Seventy-five per cent of this material will pass a 20 to 30 mesh screen. A Hum-mer screen has been installed for grading and when this is put in operation the company's products will be a little more diversified.

Provision is made on the loading track for spouting the sand into cars direct from the drain bins. Each of these bins holds enough to fill one



gondola. As shown on one of the illustrations, these spouts are very widely constructed and the gates through which they take material from the bins are quite large. Cars are moved slowly past these wide spouts by cable and friction hoist. By the time the end of the car is reached, the bin has been emptied and the car filled. The material from the dryer sand bins is passed to papered box cars through flexible metal spouts which are put in at the doors of the cars.

The plant is powered by 2 Frost boilers of 150 horsepower each and operating at 140 to 145 pounds pressure. The "kicker" doors used on these boilers are shown in one of the illustrations. These doors make it possible, when using the overhead stoking system, which drops coal inside the door, to "kick" the fuel further back into the firebox. The gates used on the boilers were manufactured by the National Stoker Co. of Indianapolis, Ind. Water is furnished by a Fairbanks-Morse and a Worthington pump.

Most of the machinery in the plant is run from electric motors operating on the current furnished by 2 Allis-Chalmers dynamos direct connected to Allis-Chalmers turbines. Current is supplied at 220 volts, 60 cycles. An amount is transformed to 110 volts for the lighting circuits. Each piece of equipment has individual motor drive. General Electric motors are used throughout. The switchboard was manufactured by the Wagner Electric Co.

An air line is run to the plant for blowing dust out of the motors and other equipment. This line is supplied by a Westinghouse compressor, from which are also run the air hammers employed around the pit.

The "crude belt," as the pit run sand conveyor is called about the plant, is powered by a 50 horsepower Buckeye

steam engine which also runs the car mover hoist near the drain bins. A 65 horsepower Ball engine is used for pulling the large cleat elevator which brings the sand to the washing and drying plant.

One of the accompanying illustrations shows the reservoir used to collect water for the boilers, and for the large pit at times when the supply obtained by seepage is less than is required for the successful operation of the sand pumps.

The Crescent Silica Company contemplates extensive improvements and additions in the near future. The bin space will be considerably augmented by extending the buildings now containing the dry sand bins, the 75-foot tower in the building intended for the grinding plant will be increased to 139 feet to allow the sand to go through a complete grinding and screening operation in its passage from top to bottom.

Coal deposits at Buffalo Rock, some 7 miles away, on the company's land are being developed. A Northwest crane will do most of the work, as the coal occurs close to the surface and is covered by a comparatively light overburden. The crane is equipped with a scraper bucket and can, when so equipped, handle both stripping and excavating. When the coal is taken out, it will be shipped by truck to the plant.

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The Western Washed Sand & Gravel Co., Milwaukee, Wisconsin, has been incorporated with a capital of \$25,000. Incorporator: Frank Schub, 1065 Second St., Milwaukee, Wisc.

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The Attica gravel pit, owned and operated by the Carmichael Construction Co., of Danville, Ill., closed down on September 9th, following the issuing of orders by the Interstate Commerce Commission regarding the loading of coal cars.

## Lime Association Meets in Chicago

### Discusses Ways and Means to Help Sale of Lime

ON September 20 and 21 members of the National Lime Association held a special convention at the Hotel Sherman, Chicago, to discuss ways and means of giving additional force to the progressive movements that are now going on within the association. The chief concern of those who attended the meeting was to increase the demand for lime in the construction and agricultural business. For a number of years the use of lime in the chemical industries has been steadily advancing, much more steadily than its use in construction and agriculture. Many of the member companies depend to a large extent on these latter markets and the association can do itself a great deal of good by stimulating the demand for lime in other than chemical fields.

A number of tentative plans along these lines were proposed at the Cleveland convention last June, and since that time Mr. W. R. Phillips, General Manager of the National Lime Association, has been to all sections of the country and discussed the details of the proposed plan with groups of lime manufacturers. This trip, extending over some 10,000 miles, gave Mr. Phillips valuable material on the attitude of members and non-members of the association toward the enlarged plan for promotional work.

The special convention just held in Chicago was for the purpose of extending discussion on the details of the needs of the lime industry as a whole in the various sections, and to ratify plans proposed up to this time and tentatively adopted.

The idea of a considerably enlarged budget for educational research and promotional purposes gained the unanimous support of the convention. The method of operating, of course, will vary somewhat in various sections of the country and will be influenced largely by purely local needs and conditions. The proposed activities cover in a general way an amount of investigational work, the development of new products, and the promotion of lime and its various uses through extensive and intensive field work.

One of the chief items of business at the Chicago meeting was discussion on the reorganization of the National Lime Association along territorial lines. An apportionment of all the states in the Union into three divisions was proposed and adopted. Each division will be in charge of a district manager, who will direct development work in his own territory under the supervision of the general manager of the association. The general manager will be in charge of all the association work, with an enlarged technical staff devoted to construction, chemical and agricultural research work. In this way it is believed that the consuming public will come to a better knowledge of the importance of lime in the fields in which it finds application.

The association will maintain a laboratory service for the free use of lime consumers in working out their problems, improving their products, and in finding new uses for these products.

The district manager plan will go into effect about October 1st, at which time announcement will be made of the names of the men who will head the new activities of the Lime Association in various sections of the country.

# Storage and Transportation of Portland Cement

BY W. M. MYERS

Assistant mineral technologist, U. S. Bureau of Mines.

THE U. S. Bureau of Mines conducted an investigation to determine the cause of the deterioration of Portland cement during storage and transportation, and to discover a means of preventing it. All available printed sources of information on this subject have been examined and a bibliography has been compiled. The subject has also been discussed with the leaders in the cement industry; the present report is the result of their cooperation, and is based principally on information thus obtained.

Deterioration of Portland cement during storage over any considerable period of time has long been noted; closely related to it is deterioration of cement during transportation, which involves not only the time factor of storage but also exposure of varied climatic conditions. Deterioration in both cases is due to hydration of the cement by absorption of moisture from a humid atmosphere, or by exposure to actual rain-fall. After hydration cement possesses no cohesive power; the degree of deterioration is directly proportional to the degree of hydration.

The amount of deterioration of Portland cement during storage has been accurately determined in an investigation by the Structural Materials Research Laboratory, in cooperation with the Portland Cement Association. Cement stored in a shed in cloth sacks retained 80 per cent of its original strength after three months storage; 71 per cent six months; 61 per cent after one year; and 40 per cent after two years.

The deterioration of Portland cement during storage and transportation was noted particularly in France during the World War. Information concerning cement used by the American Expeditionary Forces was furnished by Lt. Col. H. S. Spackman and Major E. C. Eckel, U. S. R., who had charge of practically all matters concerning cement used by the A. E. F.

The cement used by the A. E. F. came from the following sources: 42,000 tons was French, Swiss, and Spanish cements; 120,000 tons was English cement 55,000 tons made in plants operated by the A. E. F.; 500 tons (not over) from America. Deterioration was most marked in cement from the first source.

The climatic conditions in France are very severe for finished Portland cement, owing to the long rainy season and the accompanying high humidity. Cement stored for a period of two months was sometimes almost worthless. Cement was not always stored where it could be reached easily, and some storehouses were emptied in the reverse order of filling, so that the material stored first was the last to be removed; some cement, therefore, was unavoidably stored longer than it could withstand the climate.

The deleterious effect of the climates of France on Portland cement is constant. It is not dependent on unusual conditions, as is recognized by French manufacturers, who endeavor to send their product direct to the point of consumption immediately after grinding. The specifications of the French Government for the storage of cement are strict, as may be seen from the following résumé:



1. Cement must be stored in an air-tight room.

2. Cement must be covered with tarpaulin.

3. Cement must not be stored nearer than 18 inches to the wall.

Some English cement used in France was damaged further as a result of the English custom of shipping it in 200-pound bags; these heavy bags are difficult to handle, and are torn by the hooks of the stevedores, thus exposing the cement directly to atmospheric conditions.

The quality of the little American cement used was satisfactory.

In the United States, Portland cement is shipped in barrels, in cloth or paper bags, or in bulk in cars. Cement for export is generally packed in barrels. The superiority of American packing over European barreled cements has been noted by commercial agents of the United States in South America.

The use of air-tight containers for storing and shipping Portland cement would obviously prevent deterioration, but the prohibitive cost of such containers would greatly outweigh the benefits derived from their use. Two feasible improvements have been suggested that would not only improve the quality of the cement, but would also effect appreciable economy in transportation: (1) Storage and transportation of the cement in bulk; (2) Storage and transportation of the cement in the form of unground clinker, and grinding the clinker at destination.

Deterioration of cement stored in bulk is less than in bags, owing to the smaller area exposed. Hydration takes place only at the exposed surface, and the bulk of the cement is unaffected. Cement transported in bulk must be shipped in a tight, closed car, and must be protected from moisture during loading, shipping, and unloading, preferably it should be used immediately after unloading at the point of destination. This practice is

now followed by several manufacturers and where conditions are suitable it is becoming more common as its advantages are seen. Shipping in bulk effects a saving by eliminating the use of bags—which is an important item in the cost of cement and it should also permit a saving in freight rates.

Clinker, the fused product of the cement kiln before it is ground to form the finished Portland cement, is exceptionally well adapted for transportation or storage over long periods of time under adverse conditions. It is extremely inert and has no tendency to absorb moisture. Experiments show that clinker may be stored under water, or subjected to alternate dry and wet storage, without lowering the quality of the finished cement.

This cement has two distinct advantages: The quality of the cement produced from stored clinker is higher, and the grinding cost of the clinker is decreased because of mechanical disintegration.

The improvement in the quality of cement made from stored clinker is due to the hydration of any free lime, ( $\text{CaO}$ ) that may be present. Free lime is injurious to the finished cement, as it produces unsoundness. It is not present in a perfectly burned clinker, but it is present occasionally as a result of imperfect mixing of raw materials and of careless manipulation. Cement manufacturers, therefore, generally store clinker for several weeks or months before grinding. Clinker that produced unsound cement in one instance was found to yield a satisfactory product after being treated with steam to hydrate the free lime.

Though Portland cement in the form of clinker is most carelessly handled and stored without regard to humidity or climatic conditions, yet improvement rather than deterioration of quality is manifest in the ground product.

The mechanical disintegration of clinker during storage makes grinding easier, thus somewhat increasing the capacity of the mills and decreasing the cost.

Clinker, like iron ore, can be handled in bulk in large quantities. Barges or steamers can be loaded cheaply and heavy expense of using bags for the finished Portland cement may be entirely eliminated. Freight rates on clinker shipped in bulk should be lower than the rate for bagged cement, hence an appreciable saving could probably be made on this item. It would not of course be practical to ship clinker short distances to points near the source, as all demands for cement could be supplied directly from the manufacturer, the elements of transportation and storage being unimportant.

The feasibility of operating a grinding plant in connection with any cement project depends on several factors, the following of which are the most important:

1. The cost of erecting the plant. This cost would vary according to the location, and with the cost and transportation of machinery and supplies.

2. Operating cost of plant, depending among other things, on the amount and type of power and labor available.

3. Loss in possible subsequent scrapping of plant.

4. Amount of cement used and possibility of continued demand.

5. Economies to be realized in transporting clinker to mill, as against loss in material by transporting the ground cement.

6. Difference in freight transportation for clinker and for finished cement.

7. Saving by eliminating the use of bags.

The actual expense of installing a grinding plant would probably not be less than \$10,000 under the most favorable circumstances, so that it would be impracticable to grind clinker for any project using less than 30,000 or 40,000 barrels of cement.

The transportation of Portland cement in the form of clinker could be applied to any large construction project situated at a distance from the nearest cement mill in the United States; it could be applied also to a foreign market. To warrant the installation of a grinding plant in such a market, it would be necessary that the market should be located favorably with regard to cheap transportation; that it be a large consuming or distributing point; and that there be no competition from local manufacturers. Exceptionally humid climate, or other conditions injurious to finished Portland cement, would be an added inducement. In a number of South American ports these conditions exist. One cement manufacturer 12 years ago made extensive plans to ship clinker to Cuba and grind it there, apparently did not attempt to carry out his plans.

A prominent engineering company of New York is now engaged in a large construction project in Brazil, and is installing a clinker mill at Ceara, composed of two units having a capacity of 500 barrels per day. It is planned to ship Portland cement in the form of clinker and grind it at destination. The results obtained will be of great value not only as to relative costs of shipping bag cement as against clinker, as to other economies involved, but also as to the general feasibility of the whole project.

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The Buffalo Crushed Stone Co., Buffalo, N. Y., has increased its capital stock from \$20,000 to \$100,000.

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A blast of 55 tons of dynamite was set off recently by the Blue Diamond Materials Co., of Corona, Calif. A portion of the Blue Diamond mountain, as large as a city block, was brought down and is now being scooped out by steam shovels. The company was eleven months preparing for this blast.

# Solving the Accident Problem in the Cement Industry

A Paper Given Before the National Safety Congress

By J. CUTHBERT

Assistant Superintendent, Canada Cement Company, Ltd., Port Colborne, Ont.

In June, 1921, our company decided to make a special effort to try to reduce our accidents and July was selected to start our campaign for a "No-Accident Month." I will admit that we had very little experience in accident prevention work, so that we may claim to have started from the very bottom of the ladder; in fact, No. 8 had the worst record of any of the plants of the Canada Cement Company.

There was no tangible reason why our record should have been so bad as the conditions in this plant were no more dangerous than any of the others. We were making guards all the time and we were posting the National Safety Council bulletins, but I must admit that we were only doing so as a matter of routine and were not putting any personal touch into the matter. When we had an accident the foreman had to give an account of it, but we could not understand why we were so unfortunate and had such a bad accident record.

Nothing in the way of trying to arouse enthusiasm for accident prevention had been attempted—we were paying more attention to production and building up mechanical features than we were to the human condition of the plant. Our record was as follows:

| Period.              | No. of Lost<br>Time Accidents | No. of Minor<br>Accidents | Total No. of<br>Accidents | Total Lost<br>Time (days) |
|----------------------|-------------------------------|---------------------------|---------------------------|---------------------------|
| Year 1920 .....      | 48                            | 22                        | 70                        | 908                       |
| First 6 mos. 1921... | 47                            | 25                        | 72                        | 500                       |

We had our first organization meeting June 17, 1921. A central committee, composed of superintendent, assistant superintendent, the foreman of the machine shop and the foreman of repairs, was appointed. The objects of the campaign were fully explained and the full co-operation of all the foremen solicited.

Our next step was to analyze all the accidents from 1920 to date, both by departments and cause, giving the name of the injured man, his injury, the date, the cause and foreman's name. This data was given to each member to digest and at the following meeting a general discussion was had. It was soon discovered that only one accident out of the entire number could have been prevented by the installing of a guard. Everything indicated that our campaign would of necessity be one of education. A suggestion box was installed and, as is the usual case with all campaigns, the replies received consisted largely of advocating the placing of a guard here, changing a platform there, putting on a new roof, getting new chain blocks and similar matters. In order to cope with some of this work four men were detailed to the making of guards, etc., so that we might prove to the average workman that we were sincere in our efforts to prevent accidents.

We held meetings every week and discussions on plant conditions were invited, the members being encouraged to speak freely without fear of offending the superintendent, assistant superintendent, the foremen or the men. In this way a good many



unsafe places and dangerous practices were brought to light. In order to get everyone talking and thinking safety, homemade bulletins, in addition to those of the National Safety Council, were used and new bulletin boards were made and installed in the most conspicuous places around the plant.

The plant was thoroughly inspected and as many of the dangerous places as could be discovered at the time were carefully noted. The work of rectifying these hazards was carefully planned and systematically carried out. The foreman of each department was encouraged to go ahead and make up guards, using the operating and repair men at their disposal at times when they were not rushed along other lines, and in this way a great deal of very useful work was accomplished.

The record for July, August and September, 1921 (the first three months of our campaign), shows that we were not making the desired progress in our accident-prevention work. During these three months we had: Lost time accidents, 12; no-lost time accidents, 10; a total of 22. Days lost, 245.

We were not satisfied; we were not getting results. Numerous guards were being made, but we were not arousing enthusiasm in the average man—we were only reaching the foreman; so we decided to try another plan. The plant was divided into sections, each foreman having a committee of his own, he to be its chairman. Weekly meetings of these committees were arranged and a meeting of all the committees was held every two weeks. The total number serving on the safety committee was thereby increased from sixteen to fifty. Our idea was that if you could get the man interested, get his confidence, get him to talk, you could very often explain away difficulties which in some cases

existed only in his mind and you could also get ideas for overcoming of dangerous practices. If you do not encourage the man to express himself you do not learn of these things until an accident has happened or you meet him at some time when he is not expecting you.

I attended all of these small committee meetings to start them going—this was the beginning of October, 1921—giving a general talk and explaining our ideas to them; encouraging the men to show initiative and take a personal pride in the plant and its record. Each meeting lasted about thirty minutes.

It was not my intention to attend these small committee meetings after the first time, but to wait and see how the idea developed. I am sorry to say that by the end of the month the interest in them had fallen very low. Since I had proposed these meetings I was not going to see them fail because of lack of interest, so I planned to again attend each of them the following month. I attended four safety committee meetings the first four days of each week and also the combined committee meeting every second week. I did this and I concluded that although you may be an enthusiast in safety work, the interest of the man could not be kept alive in the work through this method.

It was then decided to hold a combined safety meeting every week, which was to be attended by all committees, and each foreman could have a meeting of his committee whenever he so desired. At the same time we were running a cleanliness campaign, and another idea was tried out in an attempt to make these meetings as interesting and attractive as possible. Each foreman was asked to visit some department other than his own and to make a written report on the conditions he found there, both as to cleanliness and safety; also to offer

suggestions he thought would make for better working conditions. These reports were handed to me before the weekly meeting, but the name of the foreman making a report on another's department was never divulged.

The interest aroused through this method was a wonderful help, both from a cleanliness and a safety standpoint. If a foreman was reported because of some material not being cleaned up or put away into its proper place, he would be censured by his fellow foremen, and you can rest assured that the same thing would not be reported very often. This scheme worked well for nearly six months.

In the month of October, 1921—the fourth month of the campaign—we had two or three cases of infection, which ran our lost time up rather high. In November we built a new first-aid room close to the office and employed a registered nurse. There is not the slightest doubt that the good work of the nurse had much to do with the success we attained after this date. The month of November was really a “no-accident” month, but owing to the wrong dating of a report of an accident, which happened on Dec. 2 (the case of a boy cutting his finger in the bag shed and losing four days), we were not credited as we should have been. During December the plant was closed down for extensive repairs and alterations and we really expected to have some trouble, in spite of the hard work which had been done to guard against possible accidents. We had only one case, that of a man slipping on a scaffold four feet from the ground and slightly spraining his left arm, losing one day. The total accidents for October, November and December were:

Lost time, 8; no-lost time, 3; a total of 11. Days lost, 181.

It was very encouraging to start off the year 1922 with a clean sheet and everyone resolved to do all in his

power to keep up the good work. It is a long lane that has no turning and we thought that now we were on the road to success. Some of the old school who were skeptical about accidents being preventable by education were changing their minds. They were taking more care with the new man, teaching him how to do his work, explaining to him what he should do and what he should not do and showing him the safest and easiest way.

More ideas for homemade bulletins were coming in. In the machine shop the foreman made a simple but very ingenious device to assist in giving publicity to the good work. The machine is a revolving drum, with bulletins attached to it running slowly with enough of a bulletin exposed so that a person could read it easily. The interest aroused by this method was effective, and as the need for new and original bulletins became greater our next job was to supply the deficiency. We had a young man working in the tool crib and stores department nights who lost his right leg while employed by one of the telephone companies. He was a safety enthusiast and on being asked how he would like to assist in our educational work he was only too pleased to have an opportunity to save some other chap from being as unfortunate as he.

We had a copy of the National Safety Council's slogans and this very useful little book was good foundation for our work. After selecting the slogans, and reprinting them on large bulletins, they gradually suggested other good material and in the end he had a large amount of good local matter to work with. The interest aroused by this method was a great help and in the course of two or three months we had more of the men in the plant interested in the work and some very good local bulletins were posted. From January 1 to June 30 of this year (1922), our record was as

follows: Lost-time accidents, 11; no-lost time accidents, 6; a total of 17. Days lost, 145.

Considering that five of these accidents happened on the same day, and that two were fatal, we had every reason to feel very optimistic. (The accident referred to occurred while cleaning out a water tank.) We went through the month of February without a lost-time accident and April was a "no-accident" month—not even a minor accident requiring a doctor. From March 16 to May 20, sixty-four days, we did not have a single accident.

We have a system whereby, when a department goes one month without an accident, it receives a star, if it goes three months it receives one red star, and if it goes six months it receives two red stars and so on. In conjunction with this system of stars for "no-accident months" by departments, each is penalized for accidents according to the number of men, the hazard, etc. The interest aroused by this method is very keen. The system was introduced in May of this year and made retroactive to January 1.

A specific case is that of a teamster who received a broken leg. He was under the jurisdiction of the yard foreman and engaged in cleaning up the yard. On the day of the accident he was sent to the ballground, and while on his way back the accident happened. The yard foreman thought that as he was doing something for a common sport that all departments should help to bear the loss, so after considerable discussion all departments agreed to share in the loss and to give him his star.

Another case was more difficult to decide. An oiler in the kilnroom, in pulling a switch, had his face burned and was off fourteen days. In this case the kilnroom foreman claimed it was an electrical accident and that it should not be charged against the kiln

building; the electrical department claimed that he was a kilnroom man, that he regularly performed this duty, and they had no direct control over him. The outcome was that the departments agreed to share the loss but the electrical department claimed that if they were to be partly responsible for accidents to departmental men that this increased their hazard and that their penalty in points should be lowered. This was agreed to.

Our whole campaign has been so conducted as to keep all the workers interested. We have succeeded to a certain extent, as shown by the following results:

|                          | Man Hours<br>100,000 | Accidents | Accident<br>Frequency |
|--------------------------|----------------------|-----------|-----------------------|
| January to June, 1921..  | 4.60                 | 51        | 11.1                  |
| July to December, 1921.. | 4.24                 | 20        | 4.7                   |
| January to June, 1922..  | 3.87                 | 11        | 2.84                  |

While our accident record was improving our plant was becoming cleaner and our production increasing; indeed I may claim that this has been our banner year.

The Fish & Eddy Sand & Gravel Co., Arverne, N. Y., has been incorporated with a capital of \$30,000. Incorporators: J. Fendrick, M. Weiss, H. D. Swartz.

The ouster suit, which the attorney-general of Kansas has been waging against the cement companies of that state, was settled recently whereby the cement companies instead of being penalized will pay into the school fund of the state \$25,000; to Z. T. Hazen, state commissioner, \$4,000; and to pay the cost of the case. The court has issued a decree enjoining the companies from continuing or maintaining a trust, from making any contracts binding themselves to sell or deliver cement at a standard price, from establishing a selling price, and from preventing a free and unrestricted competition among themselves and others in the sale of cement in Kansas.



## Crushed Stone Plant with Unequalled Railroad Facilities

(Continued from page 63)

electricity is used exclusively for power. Current is received at 23,000 volts from the Interurban line and transformed to 440 volts. General Electric transformers and power boards are used. All motors are 3-phase and running on ball bearings. They were supplied by the Fairbanks-Morse Company, who also furnished the motor starters. Power house work was done under the direct supervision of Mr. Nichols, who is an electrical engineer with considerable experience in power plant installation.

After cars have dropped down by gravity to the bins and been filled, they are made up into trains by a 60-ton Schenectady switching locomotive which hauls them to any one of the four railroads intersecting the company's right-of-way.

In connection with the plant of the Lake Shore Stone Products Company is an up-to-date machine shop, which includes lathe, shaper, planer and power drilling and forging equipment. It is the intention of the management to add considerable more equipment later, so as to be able to take care of practically all repairs right on the ground.

Even in its present incomplete condition, the plant is turning out a good quantity of stone. Ninety thousand tons are blasted and ready for crushing. Two 10-hour shifts are working in the quarry and at plant construction and the company has contracts at profitable prices for all the crushed stone it can produce during 1922. The dust created by the crusher is in demand by the various cement plants in the vicinity, and the very small stone is absorbed by Chicago mail-order houses who dispose of it as chicken grit. In fact, the company's

largest revenue per ton comes from the sale of dust and grit.

The company maintains an office at Sandusky, and has its main office in Cleveland. Mr. Joseph Hobart, Jr., of Cleveland, Ohio, president of the City Land and Mortgage Company of Cleveland, is president of the concern. The vice-president is Mr. Warren S. Stone, also of Cleveland. The secretary and treasurer is Mr. John E. Giedeman of Sandusky, Ohio, president of the American Banking and Trust Company of Sandusky.

## Effects of Breathing Carbon Dioxide

Experiments on the effects of breathing carbon dioxide have been conducted at the Pittsburgh, Pa., station of the United States Bureau of Mines under the direction of Dr. R. R. Sayers, Chief Surgeon of the bureau, and A. C. Fieldner, supervising chemist. About 2 per cent of carbon dioxide in oxygen produced a slight increase in lung ventilation but no subjective symptoms; 5 per cent in oxygen caused an increase in lung ventilation of about 100 per cent, but no other signs or symptoms; 7.2 per cent produced about 200 per cent increase in lung ventilation, and moderate perspiration and a slight fullness in the head were experienced after breathing the mixture for 10 minutes; 9 to 10 per cent produced about 300 per cent increase in lung ventilation, and the subject complained of frontal headache and was dizzy and perspiring at the end of 10 minutes. About 9 per cent of carbon dioxide in oxygen was breathed by some of the subjects for as long as 45 minutes, but the breathing was very laborious, and dizziness, headache, and perspiration were marked. In fact, to have done any work while breathing this mixture would have been extremely difficult.

The Leicester Lime Corp., Brandon, Vt., has been incorporated with a capital of \$100,000. Incorporators: A. F. Moriglioni, West Rutland, Vt., L. Bandillon, Center Rutland, Vt., and W. R. Shattuck of Pepperill, Mass.

## Ask Better Service

### Producers Oppose Priority Before Interstate Commerce Commission.

By Our Washington Correspondent

Declaring that priority order No. 25, issued September 19, and made effective September 21, by the Interstate Commerce Commission although it superseded priority order No. 23, did not offer the relief sought, representatives of the National Association of Sand and Gravel producers appeared before the Interstate Commerce Commission Thursday, September 21, and asked for a further modification of priority orders which would give to their industry sufficient open top cars to fill orders on hand and to meet the demand for their products.

The association was represented by President Alex Dann and a committee consisting of E. Guy Sutton, former executive secretary of the Association; J. M. Chandler, of Oklahoma; G. C. Ross, of West Virginia; H. B. Springer, of Chattanooga; W. L. Smith, of Memphis and V. O. Johnstone, of Lincoln, Ill. Each of these men argued before the commissioners and in addition an argument was made by W. C. Markham, who represented the Association of State Highway Officials and who, on this occasion, represented unofficially the Bureau of Public Roads.

The priority order issued by the commission, and effective September 21, covers preferential shipments eastward from the Mississippi, permitting the use of open top cars after the discharge of coal carried in them for transportation of road and building construction materials. In other words, producers of sand and gravel and other road and building materials may be permitted to use open top cars on their return trips to the mines. It was held in the arguments before the commission that this modification is not wholly satisfactory, and the commission was asked for a more equitable distribution of cars and cancellation of the reconsignment privilege and that affective steps be taken to prevent accumulation of back loads and empties at both points of origin and destination.

A plea against priority orders generally was made by the speakers. The

entire proceeding was conducted by President Dann and the members of the committee, there being no legal talent participating. Mr. Sutton was chairman of the committee which prepared the appeal to the commission and the plan of procedure.

Incidentally it might be stated that the issuance of the priority order of September 19 solves to a greater or lesser extent the problem of the National Crushed Stone Association of which W. Scott Eames is president. Mr. Eames held a brief conference on Monday, September 11, with Secretary Hoover of the Department of Commerce, in an effort to have priority order No. 23 modified. But now that the commission has modified the order the crushed stone producers will have the same privileges in the use of open top cars as the order gives to sand and gravel producers and to the industries connected with road and building materials. In all probability the crushed stone producers will back the sand and gravel producers in the appeal for an equitable distribution of cars and for cancellation of the reconsignment privilege.

At the hearing representatives of the sand and gravel producers based their arguments on the petition which the association had filed with the commission. This petition pointed out the inability of producers to get cars and the evil resulting therefrom, and asked the commission to distribute open top cars on an equal basis to all shippers requiring such cars for transportation of their materials, and that coal cars be available in the transportation of sand, gravel and stone in the direction of the mine or mines on the return trip. This appeal in the petition is granted in the priority order effective September 21.

Mr. Markham argued before the commission along a different line. As representative of the Association of State Highway Officials and as unofficially representing the Bureau of Public Roads, he pointed out the difficulty which states are having in obtaining road building materials and dwelt upon the value of good roads as a relief to transportation congestion, citing several instances where motor trucks have taken tremendous burdens off of the railroads. In this connection Mr. Markham said:

"We have been urged repeatedly by Federal officials to eliminate non-employment by advancing a large road



building program and yet it seems that we are repeatedly confronted at this season of the year with other Federal requirements which bring to naught the program outlined. Is it not time that the Federal Government should cease flitting from flower to flower jumping only for the honey when the flower will no longer exist if there is no one to water it? 'Shortage of transportation' is the cry heard on every hand and it needs no argument to those who are abreast with the times to prove to them that highway transportation is today a vital arm to the nation's everyday necessities."

Mr. Markham explained that on July 8, 1920, Thomas H. MacDonald, chief of the Bureau of Roads, in a similar hearing appeared before the commission concerning this same subject, and at that time quoted from the remarks of the Secretary of Agriculture made on March 1, 1919, who in turn quoted the President of the United States, as desiring the states to further their road building program not only as a public necessity but also to furnish employment to idle labor, and added:

"We have every season since that time tried to carry out that suggestion, being urged on also by the Secretary of Commerce. Surely no further evidence is needed to show that the Federal Government has been active in urging a large building program. But our experience has been very disheartening, and it seems to us that all arms of the Federal Government should, therefore, make every effort to cooperate in this very important public function. We do not believe it to be within our province to attempt to instruct this commission on what relief measures to take. However, when it is well known that some states mine no coal and ship in all their road building material, the order of September 21, wherein cars can only be used on their way to the mines, it is clearly evident that these states might as well be provinces of Canada."

The Silverdale Gravel Co., Arkansas City, Kansas, has been incorporated with 2,400 shares non-par value stock.

The Standard Gypsum Company, San Francisco, Calif., has been incorporated with a capital stock of \$500,000. Directors: Martin Uldall, W. C. Riddell, H. H. Winner, Martin Bruton and C. O. Greever.

## New Beaumont Crushers

The recent announcement of the purchase of the Beaumont Road Machinery department by H. J. Kaltenthaler of Philadelphia has aroused considerable interest in the contracting, quarry operating and road building fields, particularly when it was learned that the purchaser intended making several improvements upon the Beaumont Crusher before placing it on the market.

Several of these newly designed crushers have recently been placed in operation by the new manufacturer, H. J. Kaltenthaler.

Among other things the Beaumont crusher is now furnished with replaceable bushings.

The castings in which these bushings are placed, are accurately bored taper and the bushing turned taper on the outside, so that the bushing when placed in the castings fits the hole accurately. These bushings are inexpensive to replace as compared to the time consumed in the old method of pouring babbitt; and then still meeting the question of proper alignment. These bushings eliminate this expensive operation and insure accurate alignment at all times.

This scheme of advantage to the user has been followed all through this line of crushers. There is an interchangeability of parts in this machine that places it foremost in crusher design and workmanship. The replaceable bushings will fit in any part of the machine where the same size bushing is used, either on right or left hand side of machine. This appeals greatly to the users of crushers, as it reduces the carrying of spare parts to a minimum and reduces the time and expense when making repairs.

Plans are under way for the construction of a cement plant in the vicinity of Kaying City, China. Descriptive matter and proposals for the cement making machinery are desired. These should be addressed to Chin Wen San, care of Messrs. Tek Hua Seng, Chaochowfu, via Swatow, China. Communications may be in English but all correspondence with Mr. Ching Wen San must be in Chinese. This may be handled through representatives in China located in Swatow, Canton or Hongkong, although this district could possibly be reached through Shanghai.



## Cement Mill News

### Activities of Many Plants Chronicled by Our Special Correspondent

The July record of the Lehigh Valley cement district of Pennsylvania of having practically every mill in operation on a capacity basis, and this, incidentally for the first time in several years, would likely have been duplicated in August, September and later months of the year but for the all-important consideration of fuel. Depleted coal supply and not very encouraging aspects for immediate replenishing of stocks, have gone to mar the situation, with the result that curtailment has been necessary at a number of the mills.

Neglecting the coal situation, conditions and prospects in the industry are as bright as they have been for some time past. The demand has maintained at high point, giving every indication that 1922 would be a banner year for the mills; distribution has been equally good, and it stands much to the credit of the plants and the railroads that excellent dispatch of stocks, and reversely, the handling of empty cars, have prevailed throughout the spring and summer in the Lehigh section.

But very few of the manufacturers have been able to create any sizable reserve, and with the fuel situation rapidly heading towards actual coal shortage, the necessitated let-up will be felt keenly in this district. Every effort is being made to secure bituminous coal, and in some quarters, with a fair degree of success, at least to the extent of permitting continuous operation now. Labor conditions hold good; there is a sufficient supply of men, and those available, on the other hand, have had no difficulty in securing employment. Wage scales remain the same, as set forth at the time of the recent increase in PIT AND QUARRY.

The mill base price has advanced to \$2.00 a barrel in carload lots in the Lehigh Valley section, and considering the situation as outlined, there is rather sure indication of further increase as the fall season progresses. Another 5 to 10 cents a barrel is the prevailing opinion.

The Giant Portland Cement Co. has been the first to feel the pinch of coal

shortage, and both the Central mill of the company at Coplay, and the Reliance mill at Egypt were forced to shut down on this account recently. Fortunately, the company has been able to secure a fair supply of fuel, and operations have again been placed under way at the last noted plant.

The Lehigh Portland Cement Co., Allentown, Pa., has been operating under heavy output at its different mills in this district, and the large tonnage leaving the plants during July has been fairly equalled through the month of August. Following the development of capacity production at the three New Castle plants of the company, as mentioned in the last issue of PIT AND QUARRY, employees at the mills have seen fit to bring about a curtailment through an unreasonable wage demand, totaling approximately 25 per cent. The laborers at the mills declared a strike, enforcing idleness in a number of departments. The company has so far refused to accede to the demands. Other plants of the company are being continued at capacity, and the fuel supply is said to be in fairly good shape.

Following a strike of about a week's duration, the company compromised by granting an increase of 20 per cent, effective September 1, the action being brought about to a large extent by the similar wage increase of the United States Steel Corporation. This plant, as well as the other mills of the company, are now running full, and the fuel supply is said to be in fairly good shape.

The Atlas Portland Cement Co., Northampton, is running under good daily schedule at its local mills. Orders continue to pile up at the plant, and the heavy current shipments do not seem to be entirely sufficient for the demand. With the fuel supply holding up, this company will maintain its maximum plant operations for practically an indefinite period.

The Pennsylvania Cement Co., Bath, is operating at a high point of production at its local mill, giving employment to a large working force. It is expected to hold to this schedule of operation for many weeks to come, and orders being received insure this condition, providing that the working situation remains favorable.

The Bath Portland Cement Co., is running at an encouraging status at its Bath, Pa., plant, with every indication of continuance at the present

time. A regular working force is being employed. The company has entered suit against the Hudson Cement & Supply Co., Baltimore, Md., for \$25,000, for cement alleged to have been sold to this company over a period of years but for which payment has not been received.

Howard Rhode, advertising manager for the Lehigh Portland Cement Co., gave an interesting address recently before a meeting of the Square Club, Hotel Allen, Allentown, Pa., on the subject of the "Manufacturing and Marketing of Cement." The talk was illustrated with a number of interesting lantern slides. It traced the origin of the material back to the day of the Romans, explaining how the present Portland cement was discovered by an accidental experiment in England. He commented upon the great value of uniformity in production and the need for the chemist to bring this about.

Mill prices have advanced in practically all of the cement producing districts, with some increases ranging as high as 25 to 30 cents a barrel over the previous levels. At Leeds, Ala., a rate of \$2.10 has been established, as compared with a former base of \$1.85; an advance of \$1.95 has been made at Steelton, Minn.; at Hannibal, Mo., the price has increased from \$1.85 to \$2.00 a barrel. Producers at Universal, Pa., have fixed the local mill base at \$2.00, while a new rate of \$2.35 has been placed into effect at Fordwick, Va.; a similar rate prevails at Mitchell, Ind., and at Mason City, Ia. The mills at Iola, Kan., are quoting at \$2.10 a barrel, while at Buffington, Ind., a \$1.95 level is well established. The mill base at Hudson, N. Y., was advanced late in August to \$2.10, and remains at this figure.

The Security Cement & Lime Co., Baltimore, Md., is planning for enlargements in its plant at Hagerstown, Md., for large increase in production. Facilities and equipment will be provided to advance the output close to 50 per cent over the present run. It is expected to commence work at an early date.

The Lehigh Portland Cement Co. has been forced to curtail production at its plant at Mitchell, Ind., owing to coal shortage. A number of departments have been shut down for an indefinite period, throwing several hundred men out of employment.

The Egyptian Portland Cement Co., Fenton, Mich., has leased a portion of

the former steel car works of the Grand Trunk Railroad at Port Huron, Mich., for a term of years. The new owner plans for the immediate establishment of a new cement mill, and will remodel the different existing buildings to accommodate this line of production. Machinery and equipment will be installed at the earliest date, and it is expected to have the new mill ready for service early in the coming year.

The National Portland Cement Co., Mount Pleasant, Mich., has perfected plans for the immediate erection of the initial units of its proposed cement mill at Coldwater, Mich. The plant will consist of a number of buildings, with power house, machine shop, and other mechanical departments, and is estimated to cost close to \$500,000, including equipment. A. E. Gorham is president.

The State Railroad Commission, Texas, has recently established a rate of 30½ cents per 100 pounds on cement, minimum weight 34,000 pounds per car, from Harrys and Eagle Pass to stations on the Chicago, Rock Island & Gulf Railroad, Soney to Glen Rio, Tex., inclusive.

### Small Vertical Air Compressors

The Ingersoll-Rand Company, 11 Broadway, New York, announces a new line of small vertical belt driven air compressors known as Type Fifteen. In addition to the plain belt drive design each size is built as a self-contained electric motor outfit, driven through pinion and internal gears, or by employing the short belt drive arrangement. The compressing end and electric motor of both gear and short belt drive units are furnished mounted on a common sub-base, so that they are in no way dependent upon the foundation for correct alignment.

Several noteworthy features of construction have been incorporated, of which the "constant-level" lubrication system is the most important. Others include the constant speed unloader for plain belt drive machines; the centrifugal unloader for start and stop control machines; and the increased size of the water reservoir cooling pot.

A descriptive bulletin has been issued on these compressors which describes in detail all their features including others not mentioned above.



## Prices Hold Strong

### Much Encouragement In General News of Eastern Territory

By Our Eastern Correspondent

Business holds brisk in the sand, gravel and crushed stone markets at New York and vicinity. The threatened scarcity of basic construction materials of all kinds has given impetus to the situation, with the result that both factors, buyer and seller, are showing a keen aptitude to make the most of the favorable conditions as they stand today. As to be expected, price quotations are strong, with decided inclination to trend upward in a number of instances.

The coal situation is uppermost in mind; the growing scarcity in fuel means a curtailment in production in many quarters, with corresponding decrease in construction and building activities of all kinds. The effect of the railroad strike, such as it has been, has been more imaginary than real, throwing possible car idleness and shortage, with rail congestion, in the foreground, to act as a barrier to the development of anticipated projects in the construction and affiliated industries. Again, the labor situation is far from satisfactory, and the continual eagerness of workers in the trade to make a bid for higher wage scales is having a demoralizing effect in undermining the desired industrial stability. Pick and shovel men at New York are now receiving 60 cents an hour, while unorganized laborers are getting 45 to 50 cents.

Sand and gravel production is keeping up well, and quite in accord with current demand. Sand pits and stone quarries in New England, Northern New York, New Jersey and Pennsylvania, are showing no fear, in the wide majority, of any lag in call, and where possible are running on a basis that will allow for reasonable reserves by the time the winter season sets in. Building supply dealers continue to absorb fairly heavy quantities of materials, and are holding up their stocks in good fashion.

The prices of primary materials in the industry hold uniformly firm to levels established several months ago, and if anything, will move upwards in the fall, when other important commodities exhibit their anticipated ad-

vance. Selected gravel is quoted at \$1.75 a cubic yard in the wholesale market for standard  $\frac{3}{4}$  and  $1\frac{1}{2}$ -inch sizes; a price of \$2.75 prevails for such stocks delivered on the job in the Manhattan districts. A year ago, a figure of \$3.25 to \$3.50, retail, was current.

Good quality sand holds to the \$1.00 a yard level in carload lots to contractors and dealers. Building supply yards are quoting the stock at \$2.00 delivered, while clean, white, sharp sand is \$4.50, on the job. The Long Island producers are sending sizable quantities of material into the market.

Crushed stone, f.o.b. cars, New York, in carload lots, continues to be priced at \$1.65 a cubic yard for  $1\frac{1}{2}$ -inch material, and \$1.75 for  $\frac{3}{4}$ -inch. A number of sales recently have been recorded at slightly higher levels, but such deals carry no standardization as regards prices. In the local retail market, crushed stone is quoted at \$4.00, delivered.

Cement has advanced to \$2.30 a barrel at New York in cargo lots, f.o.b. cars without bags. The necessity for mill curtailment on account of fuel shortage has had the effect of not only increasing the price, but to bring a decided stiffening in quotations, and a still further advance is not unexpected. Delivered by truck, wholesale, a price of \$2.60 a barrel is asked; with customary bag rebate of 10 cents each, dealers are asking from \$3.25 to \$3.45 for the better grade cement, delivered.

Common hydrated lime shows an advance from \$12.50 to \$13.10 a ton, wholesale, at the warehouse; finishing hydrate is quoted from \$15.80 to slightly over \$16 a ton. Hydrate common in paper, is \$19.50 per ton in retail quarters, while hydrated finishing lime is \$24.00 a ton, retail. Common lump lime is from \$2.75 to \$3.15 a barrel at the warehouse, while finishing lump material is at \$3.64 a barrel. Finishing lime in standard 300-pound barrel at New York, retail, is \$4.50, while common lime, same size barrel is \$3.75 at the supply yards.

The large sand plant of the Goodwin-Gallagher Sand & Gravel Corporation, New York, at Port Washington, L. I., has been temporarily closed down, pending the installation of equipment to prevent the pollution of the water of Hempstead Harbor. The action has been taken in co-operation with the War Department, which has



been investigating the situation as a result of complaints of the taxpayers' associations of this district. It is planned to resume production at the earliest possible moment. The company is one of the largest shippers of sand and gravel to the New York market, and has been using about 100 scows from the Port Washington plant, as well as a number of motor trucks. Employment has been given to about 300 men at this works.

The Mallet Sand & Supply Co., New York, has been formed under state laws with a capital of \$10,000, to operate a sand and gravel business. The company is headed by M. K. Knorhel, I. E. Riessick and E. T. Hiscox. It is represented by Donnelly & Kadel, 2804 Third Avenue, New York.

The Associated Sand & Transport Co., Rochester, N. Y., has been formed with a nominal capital of \$5,000, to operate a sand and gravel business. The company is headed by A. D. and C. M. Weller, and L. Brotsch, all of Rochester. It is represented by C. E. Bostwick, Rochester.

The Lautz Marble Co., 861 Main Street, Buffalo, N. Y., will commence the immediate erection of a new one-story plant, 110x142 ft., with office structure adjoining. It will be equipped as a general marble works, for cutting, grinding, polishing, etc., and is estimated to cost about \$125,000, including machinery. The Turner Construction Co., 242 Madison Avenue, New York, has the general building contract.

The Monson-Maine Slate Co., Monson, Me., has resumed operations at its local quarry, following a three-week curtailment, due to a strike of pitmen, numbering about 40 in all. The dispute had to do with wage scale and working conditions, and a settlement has been effected by the company.

The Booth Brothers Co. and the Hurricane Island Granite Co., Rockland, Me., have arranged a satisfactory settlement with the quarrymen employed at their plants at Long Cove, St. George, Me., following differences and necessary curtailment of operations. The new agreement is for a three-year period. Negotiations are under way for a similar equitable settlement of the strike now on at the plants in the Wildcat district, St. George.

Granite manufacturers at Quincy, Mass., have entered into agreement

with their cutters, who have been out on strike since April 1 last, for a 44-hour week and minimum wage scale of \$1.00 an hour. The working schedule and wages are those in force previous to the strike, which was brought about by the announcement of the three local plants that wages would be reduced 20 per cent. The men have now returned to the plants and operations have been resumed.

The Town Committee, Newton, N. J., which has been furnishing crushed stone to the county from its plant on the Newton-Andover Road, has agreed to a reduction in price from \$1.75 to \$1.60, on the basis of crushed run. In a hearing on the matter, it was brought out that a close estimate of current cost to the town is about \$1.00 a ton at the crushing plant.

The trap rock stone quarry of the F. J. Marley Co., on the summit of the Second Watchung Mountain, Bloomfield Avenue, Montclair, N. J., at which operations were discontinued a number of years ago, is now being permanently abandoned, and all buildings, crusher supports, etc., are being removed. Hundreds of thousands of tons of cracked stone were taken from the plant during the period of production, and utilized largely as road ballast.

The Star Sand Co., Pittsburgh, Pa., has been organized under Delaware laws with capital of \$25,000, to operate a sand and gravel business. The company is headed by C. E. Frankenberg, Philip Kussart, Pittsburgh; and T. J. Chantler, Beaver, Pa. It is represented by the Capital Trust of Delaware, Dover, Del.

The Benner Slate Co., Danielsville, Pa., operating the local quarry of the Montgomery Slate Co., under lease, is developing a heavy capacity, giving employment to a normal working force. The monthly average of finished production is 1,000 squares of roofing slate, and close to 80,000 school slates.

The McClain Sand Co., Point Marion, Pa., has been formed under state laws with a capital of \$250,000, to operate local sand and gravel properties. F. L. Bowers, Point Marion, is treasurer.

The Albion Vein slate quarry, Pen Argyl, Pa., has effected a compromise with workers at the plant in their recent demand for an advance of 25 cents per square of slate. The men have accepted an increase of 15 cents, as offered by the company.

# These Are the Car Service Orders Now in Force

## Service Order No. 24

At a Session of the Interstate Commerce Commission, Division 5, held at its office in Washington, D. C., on the 30th day of August, A. D. 1922.

*It appearing,* In the opinion of the Commission that an emergency which requires immediate action exists upon the lines of each and all the common carriers by railroad subject to the Interstate Commerce Act, west of the Mississippi River, and because of the inability of said common carriers properly and completely to serve the public in the transportation of essential commodities. *It is ordered and directed;*

"1. That each such common carrier by railroad, to the extent that it is currently unable promptly to transport all freight traffic offered to it for movement, or to be moved over its line or lines of railway shall give preference and priority to the movement of each of the following commodities: Food for human consumption, feed for live stock, live stock, perishable products, mine supplies, medicines, fertilizers, seeds, newsprint paper, coal, coke and other fuel and petroleum and its products in tank cars." (Change made effective midnight, September 20, 1922).

2. That to the extent any such common carrier by railroad is unable, under the existing interchange and car service rules, to return cars to its connections promptly, it shall give preference and priority in the movement, exchange, interchange and return of empty cars intended to be used for the transportation of the commodities specially designated in paragraph numbered 1 hereof.

3. That all rules, regulations and practices of said common carriers by railroad with respect to car service as that term is defined in said act are hereby suspended so far as they conflict with the directions hereby made.

4. That this order shall be effective from and after September 1, 1922, and shall remain in force until the further order of the Commission.

5. That copies of this order be served upon the carriers hereinbefore described, and that notice of this order be given to the general public by depositing a copy hereof in the Secretary of the Commission at Washington, D. C.

By the Commission, Division 5:  
(SEAL)

GEORGE B. MCGINTY,  
Secretary.

## Service Order No. 25

At a Session of the Interstate Commerce Commission, Division 5, held at its office in Washington, D. C., on the 19th day of September, A. D. 1922.

*It appearing,* In the opinion of the commission that an emergency which requires immediate action exists upon the lines of each and all the common carriers by railroad subject to the Interstate Commerce Act, east of the Mississippi River, including the west bank crossings thereof, and because of the inability of said common carriers properly and completely to serve the public in the transportation of essential commodities, *It is ordered and*

*directed,* that effective September 21, 1922, and until the further order of the commission:

1. That each such common carrier by railroad, to the extent that it is currently unable promptly to transport all freight traffic offered to it for movement, or to be moved over its line or lines of railway shall give preference and priority to the movement of each of the following commodities: food for human consumption, feed for live stock, live stock, perishable products, mine supplies, medicines, fertilizers, seeds, news print paper, coal, coke and other fuel, and petroleum and its products in tank cars.

2. That to the extent any such common carrier by railroad is unable under the existing interchange and car service rules, to return cars to its connections promptly, it shall give preference and priority in the movement, exchange, interchange and return of empty cars intended to be used for the transportation of the commodities specially designated in paragraph numbered 1 hereof.

3. That any and all such common carriers by railroad which serve coal mines whether located upon the line or lines of any such railroad or customarily dependent upon it for car supply, herein termed coal-loading carriers, be, and they are hereby, authorized and directed whenever unable to supply all uses in full to furnish such coal mines with open top cars suitable for the loading and transportation of coal, in preference to any other use, supply, or distribution of such cars; provided, that the phrase "open top cars suitable for the loading and transportation of coal" as used in this order shall not include or embrace flat (fixed) bottom gondola cars with sides 42 inches or less in height, inside measurement, or cars equipped with racks, or cars which, on July 1, 1922, had been definitely retired from service for the transportation of coal and stenciled or tagged for other service.

4. That all such common carriers by railroad other than coal-loading carriers, herein termed non-coal-loading carriers, be, and they are hereby, authorized and directed to deliver daily to a connecting coal-loading carrier or carriers, or to an intermediate non-coal-loading carrier for delivery through the usual channels to a coal-loading carrier, or carriers, empty coal cars up to the maximum ability of each such non-coal-loading carrier to make such deliveries and of each such connecting coal-loading carrier to receive and use the coal cars so delivered for the preferential purposes herein set forth.

5. That all such common carriers by railroad be, and they are hereby, authorized and directed to discontinue the use of open top cars suitable for the loading and transportation of coal, for the transportation of commodities other than coal, so long as any coal mine remains to be served by it with such cars; and as to each non-coal-loading carrier, so long as deliveries of any such cars to connecting carriers may be due or remain to be performed under the terms of this order; provided, that such open-top cars suitable for the loading and transportation of coal, after the discharge of the coal lading thereof, may be used for the transporta-



tion of road and building construction materials, ore, mine supplies for current operation and fluxing stone for furnaces when the destination of such materials is in the direction of but not beyond the mine or mines to which such open-top cars are destined for coal loading, and when such use will not materially delay or minimize the production and transportation of coal; provided, further that an embargo be placed against the further placement of open-top cars for loading with such commodities for any shipper who shall fail or refuse to load the open-top cars within 24 hours after placement of such loading thereof.

6. That all such common carriers by railroad be, and they are hereby, authorized and directed to place an embargo against the receipt of coal or other freight transported in open top cars suitable for coal loading, by any consignee, and against the placement of such open top cars for consignment to any consignee, who shall fail or refuse to unload such coal or other freight so transported in coal cars and placed for unloading, within 24 hours after such placement, until all coal or other freight so transported in coal cars and so placed has been unloaded by such consignee and shall notify the commission of such action. This authorization and direction as to embargoes shall not interfere with the movement of coal to tidewater or the Great Lakes for transshipment by water, nor shall it apply where the failure of the consignee to unload is due directly to errors of disabilities of the railroad in delivering cars.

7. That in the supply of cars to mines upon the lines of any coal-loading carrier, such carrier is hereby authorized and directed, to place, furnish, and assign such coal mines with open-top cars suitable for the loading and transportation of coal for such special purposes as may from time to time be specially designated by the commission or its agent therefor by special priority direction in writing, in preference and priority to any other use; provided, that the open-top cars so placed, furnished, and assigned shall after loading be transported for the special purposes designated, and shall not be subject to reconsignment or diversion except by and with the approval of the commission.

For the more prompt and effectual administration during the present emergency of the authorizations, directions and requirements of this paragraph No. 7, the following persons are designated and appointed as agents of the commission, with authority to give directions as to car service and to the matters referred to in paragraphs (15) and (16) of section 1 of the interstate commerce act, and referred to in paragraph No. 7, viz.: John C. Roth, Director, E. H. DeGroot, Jr., Assistant Director, Frank C. Smith, Chief Inspector, and B. S. Robertson, Service Agent, of the Bureau of Service of the commission, and the directions so given by them shall be regarded as directions of the commission.

8. That all rules, regulations and practices of said common carriers by railroad with respect to car service as that term is defined in said act are hereby suspended so far as they conflict with the directions hereby made.

9. That Service Order No. 23 as amended, be, and the same is hereby, suspended and superseded, effective at midnight September 20, 1922.

10. That copies of this order be served upon the carriers hereinbefore described, and that notice of this order be given to the general public by depositing a copy hereof in the office of the Secretary of the commission at Washington, D. C.

By the Commission, division 5:

(SEAL)

GEORGE E. MCGINTY,  
Secretary.

## Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,423,021. Screening apparatus. Morley P. Reynolds, Cleveland, Ohio, assignor to W. S. Taylor Co., same place.

1,423,370. Revolving shaker screen. Julius C. Ohlarik, Valhalla, N. Y., assignor to Robbins Conveying Belt Co.

1,424,113. Mining-machine. Edmund C. Morgan, Morgan Park, Ill.

1,424,114. Mining-machine. Edmund C. Morgan, Morgan Park, Ill.

1,424,188. Rock-drill. William A. Smith, Denver, Colo., assignor to Denver Rock Drill Mfg. Co., same place.

1,424,451. Combined sand and gravel screen. Orlando C. Crandall, Stanwood, Mich.

1,424,750. Excavator plowpoint. Clayton, O., Anglemeyer and Frank E. Perlberg, Racine, Wis.

1,424,792. Rock-crusher. Clemens W. Ackermann, Chicago, Ill., assignor to Frog Switch & Mfg. Co., Carlisle, Pa.

The Hercules Powder Company, of Wilmington, Delaware, have reduced its prices on high explosives and B blasting powder, this reduction becoming effective on September 18th.

The state railroad commission of Montana has ruled that gypsum is not a mineral, but a rock, and should, therefore, come under the same rate as gravel and crushed rock, instead of the Class E rate which is applied to minerals.

The plant of the Oklahoma Portland Cement Co., at Ada, Oklahoma, has been running night and day recently. This plant is one of the largest west of the Mississippi river, with a capacity of turning out 6,000 barrels a day.



## Texas Is Hard Hit

### Car Shortage Causing Delay of Work and Loss to Operators

By Our Dallas Correspondent

Gravel dealers in Texas have been extremely hard hit during the last few weeks by the lack of cars for loading sand and gravel. This shortage has resulted from the priorities order of the Interstate Commerce Commission, that directed that coal cars be returned to the mines and loaded with nothing but fuel until the existing fuel shortage had been met.

The shortage of cars has been especially hard on gravel dealers operating in and near Dallas. The extensive gravel beds along the Trinity River in Dallas and Tarrant counties are recognized as among the largest and best in the state, and numerous large companies have been working these beds. The shortage of cars has caused a complete shut-down in many of the pits, while others are operating at less than one-tenth their normal capacity. Many large gravel companies with orders for gravel and sand mounting into millions of dollars are unable to move a wheel on account of inability to make deliveries because there are no cars in which gravel can be loaded.

According to A. W. Clem, head of the Clem Gravel Company of Dallas, one of the largest operators in the Dallas district, the car shortage at this time is due directly to Order No. 24 of the Interstate Commerce Commission. Mr. Clem explained that the gravel industry has depended altogether on surplus of coal cars for moving sand and gravel, and the order has brought a complete shut-down at many of the pits from which deliveries were made only by rail, loading being done direct from the pits to cars by means of steam shovels or drag lines. There is no surplus in coal cars at this time, nor will there be for some time, according to Mr. Clem, as the shortage of coal in some industrial sections is so great that cars will not be released for use in transporting any commodity other than coal for several months. In the meantime many large sand and gravel companies will face conditions little short of bankruptcy.

The shortage of cars is being felt most keenly in and about Dallas by

the Clem Gravel Company, the J. Fred Smith Company, Vilbig Bros., Trinity Gravel Company and Hunter Ferrell Contracting Company. These companies depended altogether on railway deliveries or operated only a few motor trucks or teams for making deliveries.

The contracting firms in Dallas are also feeling the effect of the car shortage, as many large contracts have been tied up indefinitely on account of the inability of the firms to get sand and gravel. The J. Fred Smith Company reports more than \$2,000,000 worth of road and street paving and city sewer contracts on hand, and the company can not deliver a yard of gravel until the car shortage is relieved.

Dallas county is also suffering a great handicap on account of difficulty in getting road building materials for its highway construction program. The county is now at work on several concrete highways and also the Belt Line Highway which is to encircle the city just inside the county line, and gravel and sand are being used in large quantities in this construction work.

According to Jack Witt, county engineer, the county will have to shut down much of its construction work at once unless the gravel shortage is relieved. The county has a number of large motor trucks obtained from the War Department, but this fleet of trucks is altogether inadequate for hauling all the road building material needed, if haulage is to be made from the gravel pits and sand banks. The trucks have been employed in hauling from the nearest railway sidings, generally less than a mile, and have been kept busy. If the hauling must be done from the gravel pits, sometimes as far as ten or fifteen miles away, the trucks will prove altogether inadequate, according to Mr. Witt, and the county will have to curtail its construction program, shutting down work altogether on many jobs, until the car shortage is relieved.

Those gravel companies operating in Dallas and Fort Worth that maintain their own wagons and teams or motor trucks for making deliveries, are operating at full time, but these companies can care for but little of the business.

Since the car shortage has become acute there has been a hardening of sand and gravel prices, although the

advance has not been great. Gravel can still be had delivered on the job in small quantities for \$4.00 to \$5.00 a cubic yard, although it is impossible to get gravel in quantity. Prices are not being quoted f. o. b. cars for there are no cars and none is being delivered this way.

The Southern Marble and Stone Company of Yoakum, Texas, has elected officers and directors for the ensuing year as follows: William Green, president; Philip Welhausen, vice president and treasurer; E. C. Koerth, secretary and C. L. Moore, general manager. The directors are: William Green, Philip Welhausen, W. L. Burton, J. H. Smith, Louis Trautwein, and J. W. Cearley.

The Salina Gravel Company of Muskogee, Okla., has voted to increase its capital stock from \$10,000 to \$200,000. The company will acquire additional beds and greatly enlarge its operations at Muskogee, it is announced. The vast road-building program upon which this county is entering has increased the demand for gravel to such an extent that an enlarged company was needed if the demand was to be met.

The International Gypsum Co., Seattle, Wash., has been incorporated with a capital of \$60,000. D. McMaster and J. T. Dixon.

The Los Angeles Rock and Gravel Company have recently purchased four acres at Twentieth & Alameda Sts., Los Angeles, and will shortly build a spur track to this site. Bunkers for loading cars, with a capacity of 10,000 tons, will also be erected. This company has also acquired the fee to 400 acres between Baldwin Park and El Monte, Cal., and plans are being made to erect a complete excavating, crushing and washing plant to have a daily capacity of 5,000 tons.

Mr. Geo. D. Van Sciver, president of the DeFrain Sand Co., is building a three-mile private railroad at a cost of \$250,000, from his sand pits at Morrisville, Pa., to the Delaware river. The railroad will deliver the sand to the barges which can be towed down the river to Philadelphia, Camden, Chester, Wilmington, and other points. Saving of freight charges and quickness of delivery will make this a very profitable investment.

## Hardship in Indiana

### Car and Coal Shortage Producing Their Inevitable Effect

By Our Indianapolis Correspondent

A scarcity of open top cars is reported from many sections of Indiana and the famine is working a considerable hardship on the many road improvement projects which are yet unfinished. Members of the Indiana Highway Commission are getting really worried over the situation. Several projects are held up on account of inability to get crushed stone from the quarries because of lack of cars and sand and gravel men also are complaining because of lack of cars for shipping. The highway commission has appealed to the public service commission relative to more cars in view of the fact that thousands of farmers virtually are marooned on their farms because of the extensive program having torn up the roads surrounding them. The commission has attempted to show the railroads that cars being returned to the coal fields are suitable for gravel and crushed stone to road projects in those fields. The New York Central railroad in Indiana has annulled about eleven local trains out of Indianapolis that there may be more motive power for freight transportation.

The return of the Indiana coal miners to work means little of immediate benefit to the producing division of the trade in Indiana. Nor will it mean a great deal for at least another month. Mine operators in this state say it will be at least four weeks before normal production will be reached by their mines. Cave-ins during the five months the mines have been abandoned, necessary repairs to machinery and the like will make it impossible to hoist coal as it should be done before that time.

Rail officials of the state have promised that cars sufficient to take care of maximum production will be supplied, but the operators are extremely doubtful. They point to the fact that never yet have the railroads of the state accomplished this feat, even under the most auspicious circumstances, and now in their present predicament, operators say they will be



fortunate to work their mines three or four days a week.

Right now the trade's plants are suffering more than they have this summer. Even those plants which operate electrically are to feel the pinch in higher utility rates, for the chairman of the public service commission has given a warning to this effect. It is certain the first coal mined in Indiana will go to the state institutions and the public service corporations. The trade will have competition also in its demand from the retail dealers. Most of the dealers' bins are empty of domestic fuel and the fall demand has started. Operators here have not decided on a mine cost per ton, but it is generally conceded the price will be about \$4. With freight rates and handling charges, the trade will pay about \$5.50 to \$7 a ton delivered. Alfred M. Ogle, president of the National Coal Association, with headquarters in Indianapolis, is confident that, while there will be no overabundance of coal for industries this winter, there will be no actual suffering and no plants will have to further curtail production or suspend operations.

The Indiana Highway Industries Association is the name of a new organization which has been formed for the purpose of "obtaining fair specifications and fair consideration from the State Highway Commission," and resolutions that have been adopted ask the modification of several points of the commission's policy. Brick and asphalt construction interests are interested in the new organization, the executive committee of which is made up of the following:

William F. Fisher, representing the oil asphalt industry; J. C. Kelly, representing the rock asphalt industry; J. A. McDonald, representing the lake asphalt industry, and Robert H. McKinley, representing the paving brick industry. Contractors are expected to select a representative on the board soon. The association was not formed with any thought of political embarrassment to the state administration, Mr. McKinley, secretary of the Indiana Paving Brick Manufacturers' Association, said. Nor does the association oppose the building of concrete highways, he said. He said the asphalt and brick construction interests desire only a square deal such as that they receive in other states,

and in the recommendations of the United States bureau of public roads.

Judge Moll in superior court in Indianapolis has overruled the demurrers of two Bedford stone organizations and fifteen affiliated companies and individuals named as defendants in an anti-trust injunction suit brought by U. S. Lesh, attorney general of Indiana, last March. In the demurrers it was asserted by the defendants that the complaint did not present facts justifying the conclusion that they were attempting to destroy competition or restrain trade. The overruling of the demurrers means that the case will be brought to trial later. The court ordered the defendants to submit answers some time during September.

The new mill at Speed, Ind., being built at a cost of \$500,000 by the Louisville Cement Company to take the place of the old mill destroyed by fire July 13 with a loss estimated at \$300,000, is making good progress and will have a capacity of 2,500 barrels of cement, compared with 1,800 for the old mill. All machinery will be electrically driven.

Officials of the Indiana Quarries Company, of Bedford, Ind., are considering the reconstruction of their stone plant which was destroyed recently by fire. The loss was approximately \$300,000. The new plant will be of brick, stone, steel and reinforced concrete. Plans have not been completed.

The Millwood White Sand Co., Jackson, Ohio, has been incorporated with a capital of \$120,000.

Work is being started on the new gravel plant of Mr. R. H. Eastwood, Grayville, Ill. Construction has been delayed on this plant owing to the loss of several cars of lumber, which have only recently been located.

The Northwestern district office of the Traylor Engineering & Mfg. Company has been moved from 615 Mohawk Bldg., Spokane, Wash. to 815 Alaska Bldg., Seattle, Wash. Mr. W. H. Agens is district manager. This change in location was made because of the fact that it will be easier to reach the mining interests of the extreme northwestern United States, British Columbia and Alaska, from Seattle.



## Louisville Doubles Trade

### In Spite of Transportation and Other Troubles

By Our Louisville Correspondent

While building operations in Louisville are showing some signs of slowing down now, the year as a whole so far has been practically double last year, and even the late summer months the builders carried on at the rate of about a million dollars a month. This together with the program of street and alley construction has furnished a good run of local business for sand and gravel people and it has helped out considerably.

The main trouble in the latter part of the summer has been that of transportation. There is a very good carlot business in sand and gravel and it has been limited mainly by car troubles. Most of the coal cars have been reserved for handling coal and it has been quite a problem to keep enough cars coming to serve the carlot business. At that, however, a fairly good volume of business is being done and at this writing there is some easing in the tension of car supply which promises to make the business good through the fall.

Meantime the good roads work has continued and other contracts are being let or will be let soon. For example there are contracts for 75½ miles of state and federal highway construction to be let by the State Highway Commission at Frankfort, September 27. Also the Maintenance Department is inviting bids on a bridge over Rolling Fork in Marion County.

Recent reports to the Chicago Automobile Association showed that southern states have added forty million dollars to their highway improvement funds this summer. The showing of Kentucky in this report is that it has made improvements in its roads and has contracts under way estimated at \$875,000.

In addition to the road work which is going along earnestly, another thing of interest especially to quarry and cement people, is reports that there is to be seven million dollars hydro-electric dam project undertaken on the Licking River near Falmouth, Ky. S. A. Tescher, an Indianapolis Engineer, has been making surveys

and inspections, and it seems has obtained options on land, but it is not yet announced who it is behind the project.

We have just closed State Fair Week here, which brought a big crowd to town and helped stimulate a new interest in good roads work.

One of the exhibitors in the Merchants and Manufacturers Bldg., at the State Fair was the Ohio River Sand and Gravel Co., which had a well equipped booth.

Right near by one of the most elaborate booths of the Fair was that of the Louisville Cement Co., which showed a modern farm home and gave some interesting illustrations of how concrete can be more extensively used on the farm to advantage.

The E. T. Slider Co., report that they have had a good demand all summer and they have done a fair amount of carlot business though this has been hampered some with car restrictions and transportation troubles. At times they were not able to load coal cars at all except when routed to coal mining territory, but lately Mr. J. E. Lloyd, manager of the Louisville yards, said he noticed some easing in the restrictions on coal cars so he has a feeling that the transportation end may show a little improvement.

The Kosmos Cement Co. say that they have had quite a problem in the matter of coal supply lately and have had to curtail their operations and shut down part of their plant. Incidentally the higher cost of coal has added materially to the cost of cement.

Indirectly the coal shortage and the consequent high prices is resulting in some curtailment and closing down of building operations. The resultant increase in cost of material together with higher wages have caused contractors to figure higher so as to be safe and this has caused hesitancy and some abandoning of construction projects. So the coal shortage has perhaps done as much as anything else to curtail fall building projects.

Dr. Oliver Bowles, mineral technologist of the United States Bureau of Mines, is making a general study of the technology of limestone quarrying. Dr. Bowles recently visited a number of limestone quarries in Virginia and West Virginia for the purpose of making observations.

## Regulations For Mining

### Issued by Government to Control Various Minerals

Operating regulations to govern the methods of mining oil shale, phosphate, sodium, and potash on leased public lands of the United States have just been issued by the Bureau of Mines, which is intrusted with the supervision of such operations.

The regulations provide that it shall be the duty of the supervisor and district mining supervisors to visit from time to time leased lands where operations for the discovery or mining of oil shale, sodium, phosphate, or potash are conducted; to inspect and supervise such operations with a view to preventing waste of mineral products, or damage to formations or other mineral deposits; and to supervise operations and conditions for the promotion of the safety, health, and welfare of workmen. Supervisors will submit recommendations for safeguarding and protecting the lives and health of the employees, the property, the minerals, and the mineral-bearing formations.

The lessee shall prepare such maps as in the judgment of the mining supervisor are necessary to show the surface boundaries, improvements, and topography, and the geological conditions so far as determined from outcrops, drill holes, prospecting, or mining.

The underground and surface sanitary, welfare, and safety arrangements shall be in accordance with the recommendations of the United States Public Health Service and United States Bureau of Mines. All employees shall be afforded all possible protection to life and health. All mechanical equipment used for the transportation of men shall be of a safe design. Adequate shelter holes shall be made, guide rails or fences shall be erected, and warning signs posted at dangerous walks or passages; all moving parts of machinery or belts, when endangering employees or liable to result in injury, shall be adequately guarded. In the mining and milling or treating of the ores or mined products, the employees shall be adequately protected from injurious fumes, acids, dusts, and harmful or dangerous conditions. In mines where siliceous or other harmful dusts

are formed, drills shall be of the water-injection type and sprays shall be used to wet down the dust.

Lessees shall maintain for each underground operation sufficient amount of ventilation for such men and animals as may be employed therein.

The lessee shall store, thaw, transport, issue, and use explosives only in the most approved manner and with due regard for the safety and welfare of the employees and protection of property.

Mining operations shall be conducted in a manner to yield the ultimate maximum recovery of the oil shale, phosphate, sodium, or potash, due regard being taken to protect with adequate pillars all shafts, main exists, and passageways, also all beds or mineral deposits overlying the deposit being worked that at a future date many be of economic importance.

The regulations also cover the subjects of fire protection, escape ways, electrical equipment, disposal of waste rock, the submission of core or test hole records, and the application of improved milling methods.

Copies of these operating regulations may be obtained from the Bureau of Mines, Washington, D. C.

Statistics compiled by the United States Bureau of Mines show that during the first half of the present year, 149,124,520 pounds of explosives have been sold for use in the United States, a decrease of 3.6 per cent below the corresponding period last year and 42.8 per cent below the first six months of 1920. Of this total, 45.4 per cent was for coal mining, 22.7 per cent was for other mining, 8.1 per cent was for railroad and other construction work, and 23.8 per cent was for miscellaneous work.

Fire of unknown origin destroyed the buildings and equipment of the Fred Hartung & Son stone quarry, Swan Road, Wauwatosa, Wis. The loss is estimated to be about \$50,000.

The Union Chain & Manufacturing Co., have moved their plant from Seville, Ohio to Sandusky, Ohio. They are now on the main line of the New York Central Railroad. A new catalogue is being put out by this company and will be mailed shortly to all customers and to those who have requested one.



## Activities In Memphis

### Good Business — New Warehouses — News Notes

By Our Memphis Correspondent

September activities in Memphis and vicinity on sand, gravel, etc., have been very active and with open weather the autumn season must certainly be fraught with big business. Some trouble in getting cars is reported by operators. The gravel and sand pits are frequently on branch lines, and in competition with the harvest crop movement have to bide their time. There is also considerable activity by river, some of the companies operating in Memphis having their own boats that ply the Mississippi river.

The Fischer Lime and Cement Company on Walnut street are pushing to completion their large warehouse addition at Memphis, part of which has been in use for sometime, but the front of the structure, dining room for employes and display rooms are being finished. Kaucher and Hodges are the contractors and E. L. Harrison, the architect. The warehouse covers practically an entire block on the Southern Railroad between Linden, Pontotoc and Walnut streets. The sand and gravel offices of the Greenville (Miss.) Stone and Gravel Company and the crushed stone business operated at Williford, Ark., is quartered in this building. The firm is filling many contracts in Memphis on buildings and street work.

John A. Denie's Sons Company have just moved from their location of half a century at 82 S. Front street to their new home which they erected at 373 Adams avenue along the Southern Railroad tracks at Memphis. The building is of hollow tile and stonecote, the front decorated with ornamental stonecote casting and the interior trimmed in moulding plaster of unique design. A section of the building is reserved for the display room. The Denie Company has always been very active in the wholesale in the wholesale lime, cement, sand and building material trade. These people were among the first distributors in Memphis of Portland cement and the first manufacturers of lime in this section of the country. They are now supplying material on the Catholic Club and

numerous other large structures under erection in Memphis.

The Missouri Portland Cement Company U. and P. Blank Bldg., Memphis, Tenn., report brisk September trade in sand, gravel and other materials. Their river activities and yard activities in North Memphis are very considerable at this season.

The Allen Gravel Company Exchange Bldg., Memphis is active in the Mississippi Valley section with their Tishomingo gravel and are supplying material for numerous road contracts.

### Good Construction Record

Contracts awarded in the 27 Northeastern States during August amounted to \$322,007,000, according to the F. W. Dodge Company. This figure was 46% over that of August, 1921, and only 8% under that of July, 1922. That a seasonal decline has set in after four months of unprecedented activity and that the decline is so slight would seem to be a most wholesome indication for the remainder of the year.

The August figures brought the total for the year to date up to \$2,362,872,000, which is not only the largest figure for the first 8 months of any year, but is greater by 7 million dollars than the total for the entire year 1921. Comparing this year with 1921 on the 8 months basis this year is 58% ahead.

The outstanding feature of the August statistical statement is the increase in industrial plant construction which amounted to \$67,873,000 or 21% of the month's total. This is the largest monthly figure of this class since March, 1920. One project accounted for 35 millions of this large total, the by-product coke plant of the Carnegie Steel Company near Pittsburgh. Even omitting this large single project, the remaining amount is greater than any monthly total since November, 1920.

Residential building still maintains the lead in August, with \$100,822,000 worth of contracts, or 31% of the total. Public works and utilities amounted to \$49,825,000, or 15%; business buildings, \$38,122,000, or 12%; and educational buildings, \$32,055,000, or 10%.

Contemplated new work reported during the month amounted to \$371,249,000.

The Trenton Lime Co., Remsem, N. Y., has increased its capital stock from \$40,000 to \$625,000.





### Latest Portable Loader

Herewith is illustrated a new portable loader recently produced by the Jeffrey Manufacturing Company, Columbus, Ohio.

For the mounting of present day loaders a three-point suspension is almost universally used, keeping the machine more stable on rough and soft ground, the latest and most satisfactory arrangement being the substitution of a crawler or caterpillar mounting similar to that used on war tanks, but of a lighter construction and with a three-point support to the frame.

The buckets used on the Tanktred Loader are of very heavy malleable iron and are provided with steel cutting edge extending well around the ends of the buckets, which protects the buckets from wear and is itself renewable. The whole bucket is so designed that the digging edge has a cutting clearance at all points.

The whole foot of the elevator is so constructed that the buckets are wider than any other part, so that the whole machine can be advanced several feet into the pile with nothing but the clean cutting edge of the buckets coming in con-

tact with the material and consequently will handle reasonably hard or frozen material even if it will not flow.

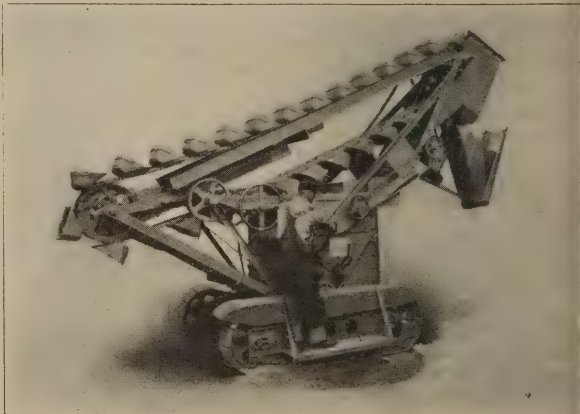
Another distinctive feature of this loader is a relatively large foot wheel, which, by reducing the centrifugal force, enables the buckets to pick up the material and especially the large lumps without kicking them away. A flexible wood boom keeps the buckets digging, but will spring enough to release the buckets from overload strain when they encounter a cave-in or such an obstruction as

a railroad tie.

Two speeds, a traveling speed for moving the machine from place to place, and a feeding speed for driving the machine directly into the pile, give a wide flexibility of operation.

A universal swivel spout applied to the Jeffrey loader enables the operator to spot the material into various portions of the truck with very little change of position of either the truck or the loader and saves a great deal of time and manual labor in spreading the load. The truck may be driven in front of the loader equipped with this device and every position of the bed may be filled without moving the truck, even if the loader in the meantime had to change position.

In order to increase the capacity



of loading machines by keeping the elevator at work while a full truck is being pulled away and an empty one driven into place, storage hoppers have been developed, so arranged as to catch the discharge from the buckets and provided with a quick opening valve by means of which the contents of the hopper can be promptly discharged into truck. These hoppers are sometimes made with adjustable sides so as to correctly measure material for a batch for concrete mixing machines.

## Slate Quarry Accidents

### Four Killed and 385 Injured During the Year

Accidents at quarries throughout the United States producing slate in 1921 resulted in the death of 4 of the employees and the injury of 385, according to the Federal Bureau of Mines. The accident rates were 1.41 killed and 135.33 injured per 1,000 300-day men employed, as compared with 1.49 killed and 108.20 injured last year.

Reports from operating companies showed that 3,564 employees, who averaged 239 working days during the year, performed 853,496 days of labor. The number of employees indicates a gain of 68 men, but the length of the work year was 50 days shorter than in 1920, and the amount of work done represents an aggregate loss of 155,748 shifts. Employees of Pennsylvania slate quarries numbered 2,002; those in Vermont numbered 866; and those in Virginia 255.

Of the number of men working last year, 2,695 were employed in and about the quarry pits; they worked a total of 625,196 shifts, or 232 days per man. Three fatalities and 280 injuries occurred, resulting in rates of 1.44 killed and 134.36 injured per 1,000 300-day workers, as against 1.96 killed and 87.81 injured in the preceding year.

At the outside or rock-dressing plants 869 men were employed; they worked 228,300 shifts in all, averaging 263 days per man. One fatality and 105 injuries occurred, representing accident rates of 1.31 killed and 137.98 injured per 1,000 300-day workers, as compared with none killed and 172.20 injured in 1920.

Of the total of 3,564 men employed at the quarries and outside plants 2,

840 men, or 79.7 per cent, were reported employed on the basis of nine hours per day.

Nonfatal accidents inside the quarries resulted mainly as follows: handling rock at face 57, falls of rock or overburden 31, flying objects 21, machinery 14, nails and splinters 14, and falling objects 12. Three men were killed by falls of rock or overburden. At the outside plants 36 men were injured by handling rock by hand, 14 by nails and splinters, 13 by machinery, and 8 by flying objects.

The total number of accidents reported were classified by the Bureau of Mines as follows: 4 fatal, 2 permanent total disability, 20 permanent partial disability, 70 temporary disability lasting more than 14 days, and 293 temporary disability lasting from 1 to 14 days.

## Pulverizer Catalogue

A catalog on swing hammer pulverizers has just been issued by the Jeffrey Manufacturing Company, of Columbus, Ohio. This catalog is known as No. 368 and is devoted to swing hammer pulverizers of the following types.

Type "A" for general purposes.

Type "B" for break-down machines and fine grinding.

Type "D" for fine grinding of limestone and similar rock.

The catalog lists a large number of materials for which these pulverizers are suitable. In addition to the catalog illustrations and descriptions, there are also given a number of views of actual installations of these machines.

The McAlpin Hotel, New York, has recently included a number of books on cement and concrete in its industrial library.

J. C. Glenn, West Tulsa, Okla., is erecting a \$25,000 sand plant on the west banks of the Arkansas River. Operation will be begun as soon as the machinery, which is on its way, is received.

The Atlas Engineering Company of Amherst, Ohio, has joined forces with the Kennedy-Van Saun Mfg. & Eng. Corporation of 120 Broadway, New York City.





Differential Utility Cars

## Utility Cars

A type of car which can be used to advantage by many producers of pit and quarry products is manufactured by the Differential Steel Car Company, Findlay, Ohio, and is described in Bulletin No. D4 which is published by this company.

These are called differential utility cars and are specially designed to dump their load clear of the track. For this purpose the differential mechanism moves the body 3 feet to either side and balances it.

These cars are electrically moved and dumped. The bodies are divided into compartments so that three different kinds of materials can be handled at the same time, if desired.

Some of the cars are made with motors, while others are merely trailer cars to be attached to the motor car. They have a capacity of 18 cubic yards.

While they can be utilized in a great many places, their chief value will be where there is a long haul from the quarry or pit to the plant. There will also be many places where they can be used for delivering products, especially on street car or inter-urban trolley lines.

## Sales of Permissible Explosives

Sales of permissible explosives reported to the Bureau of Mines in 1921 aggregated 41,133,851 pounds, and represent not only a reduction of nearly 13,000,000 pounds, or about 24 per cent below the preceding year's record, but also a lower quantity than was sold either in 1917 or 1918. Except for these three years, however, more permissibles were sold in 1921 than in any preceding year. They are fast replacing other high explosives and black

blasting powder in coal-mining operations.

Of the total sales of permissibles in 1921, the mining industry consumed 94.7 per cent, as compared with 90.7 per cent in 1920. Coal mining consumed 38,055,650 pounds (92.5 per cent) and other mining used 881,710 pounds (2.1 per cent). Railroad and other construction work used only 262,545 pounds, or about six-tenths of 1 per cent.

## Hoists

The Lidgerwood Mfg. Company, of New York, has just issued a special catalog on Lidgerwood two-speed hoists for slack line cable excavators.

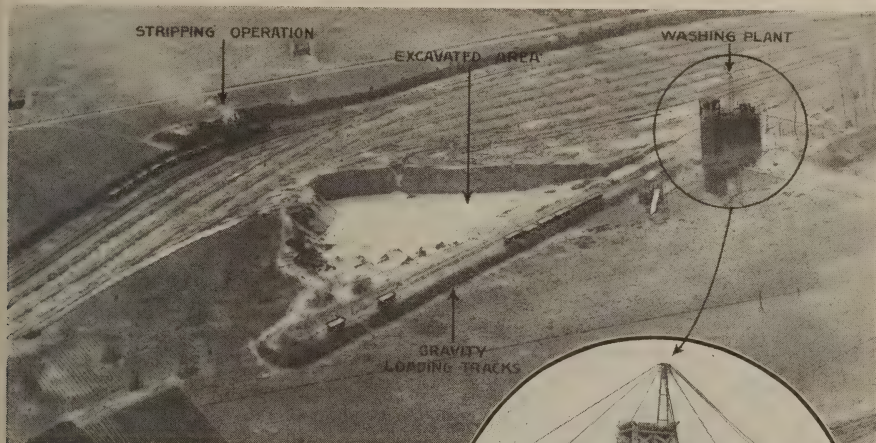
These are particularly designed to stand a very severe usage on this work. They have a two-speed arrangement of gears giving very powerful line pull while the bucket is digging, and a high speed with light pull for a rapid return of the empty bucket.

They are all self-contained on a box form of bed plate, with specially designed frictions, ventilated break and friction flanges.

Some of these are designed with electric motors direct connected, others, for a belt drive, and still others for steam operation. In the case of these latter there is, of course, no necessity for a two-speed drum as the characteristics of the steam engine, with its ability to pull hard at slow speed and to speed up at reduced loads, give the necessary speed variations.

The Palmer-LaRue Sand & Gravel Co., Chagrin Falls, Ohio, has been incorporated with a capital of \$5,000. Incorporators: C. B. Palmer, Norma B. Palmer, Charles P. LaRue and Nellie E. LaRue.





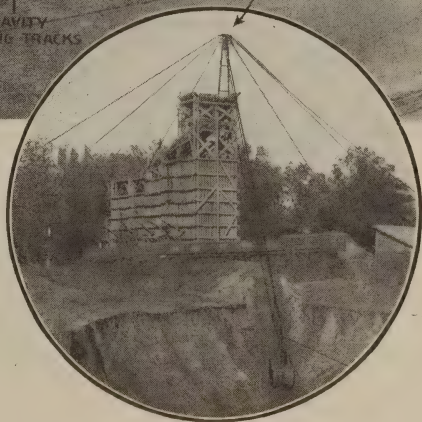
Premier Sand and Gravel Company  
Birmingham, Ala.

## CLEAN GRAVEL BETTER CONCRETE PERMANENT ROADS

**G**OOD concrete construction depends upon clean sand and gravel, properly graded, and free from vegetable matter and other foreign substances.

The airplane view above shows a modern plant for screening and washing sand and gravel.

A steam shovel strips the overburden and loads it into cars. The gravel is excavated with a dragline cableway bucket which dumps into a Link-Belt washing plant.



Three sizes of gravel and two sizes of sand are produced. The Pittsburgh Testing Laboratories report of concrete made from this product gives it a tensile strength of 137% and a compression test of 111%, which means good concrete and roads that are good when the bonds are retired.

Let our engineers figure with you on your problem.

0958

### LINK-BELT COMPANY

Chicago—300 W. Pershing Road

Philadelphia—Hunting Park Ave. & P. & R. Rwy.

# LINK-BELT

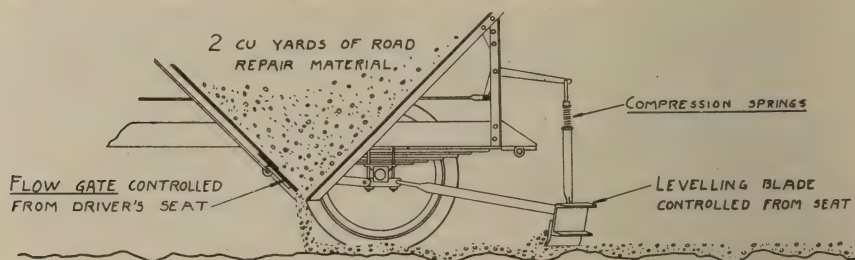


DIAGRAM SHOWING PRINCIPLE OF "PATROL" OPERATION

## The "Patrol"

The "Patrol" is a highway maintenance truck manufactured by the Greenville Mfg. Co. of Greenville, Ohio. It is a product of the engineering department of the Greenville Gravel Company.

The truck holds two yards (3 tons) of gravel or any road repair material. It is constructed with a long narrow sliding gate extending entirely across the lower extremity of the front sloping side of the body. This gate can be opened 1, 2, 3, or up to 6 inches, creating a long slot which permits an even flow of material across the roadway of any thickness desired, the full width of the body.

An adjustable scraper or levelling blade, attached to the rear axle and also controlled from the driver's seat, further spreads the material and levels it over chuck holes, ruts, etc.

The sliding gate can be readily opened and closed, thereby giving the driver absolute control of the amount of material he is spreading. He can furthermore open one side at a time, permitting him to fill chuck and mud holes on either side of the road without spreading material over the balance of the surface in case none is required. It has also been used successfully as a power unit for pulling light road graders.

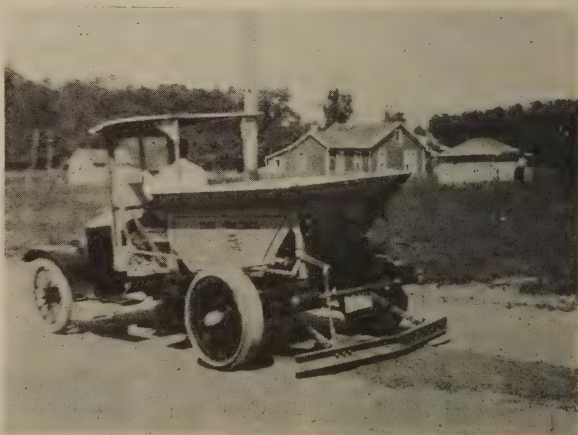
The machine travels at the rate of 12 to 15 miles per hour and has been found to equal the amount of hauling ordinarily requiring six teams and wagons. By

virtue of the fact that it also spreads the material as it goes, thus further saving time and labor, it has proven to be the greatest money and labor-saving device which has been perfected in many years. It is being used on state highways, county roads, and city streets with equal success.

The "Patrol" is built on a standard Ford truck chassis. The front half is all Ford and the rear half is of 3½ ton truck construction with wheels, axle, springs, etc., to correspond.

The "Patrol" sells for \$1,350.00 f. o. b. Greenville, Ohio. Such a price for a 3-ton truck will insure its universal use.

The Lehigh Portland Cement Company of Allentown, Pa., has recently acquired a tract of land containing an extensive limestone deposit, at Tarrant City near Birmingham, Alabama. The company proposes to erect a cement plant on this property, with a capacity of approximately 1,000,000 barrels per year.



The "Patrol"



## Where Western Dump Cars "Make Good"



*Carbon Limestone Quarry, Hillsville, Pa.*

Stripping proceeds on the two upper levels in the above quarry—Western 4-yd. dump cars (narrow gauge) above; Western 12-yd. dump cars (standard gauge) below. Further down on the ground level are the quarry cars.

When those 4-yd. Westerns were substituted for the 5-yd. cars in use, they "increased production 50 per cent, due to the cars alone," according to the Superintendent.

Our new Catalog No. A-53 describes many successful installations throughout the country. A copy will be sent on request.

**Western** *That's Why*

## Western Wheeled Scraper Company

*Earth and Stone Handling Equipment,*  
**Aurora, Illinois**



## Crusher Catalogue

The Austin Manufacturing Company, 400 N. Michigan Boulevard, Chicago, has recently issued Catalog No. 29 on Austin gyratory crushers and general rock crushing equipment, including elevators, conveyors, screens, etc.

One of the features of the catalog which will be studied with great interest is the section devoted to plans of a number of different types of rock crushing plants.

This company maintains an engineering department for the purpose of designing these plants, and also has a construction crew to take charge of the installation of equipment when desired.

The Pine Creek Lime & Stone Co., Jersey Shore, Pa., has been incorporated with a capital of \$50,000.

Mr. Chester J. Pegg, formerly assistant superintendent of the Tidewater Portland Cement Co., Union Bridge, Md., has been put in charge of the Limestone Products Corporation of America, Newton, N. J., in the capacity of General Superintendent.

## Excavator and Loader

An illustrated folder on the Smith excavator and loader has just been published by The T. L. Smith Co. of Milwaukee. It features the fact that men who are using these machines for many kinds of work—drag line excavating, excavating sand and gravel, stripping, and miscellaneous handling—are saving considerable time and money. Illustrations show how contractors are able to keep their wagons out of the hole and how they eliminate the need for building and maintaining an incline. The new truck-type, four-cylinder motor of 4-inch bore and 5-inch stroke, now used, is also shown.

Following the action of the Trunk Line Association in New York on June 11, granting the request of the National Association of Sand and Gravel Producers for reduction in the minimum weights on sand, gravel and crushed stone, Central Freight Association lines have also approved a minimum weight on sand, gravel and stone to a basis of 90 per cent of marked capacity of car to apply between points in C. F. A. territory effective October 1.

## A Little Oil Now and Then



is the only attention Gruendler Crushers require.

This Limestone Plant is Gruendler designed and equipped. As is characteristic of all Gruendler Plants, it is equally efficient in crushing limestone for fertilizer or rock for roadwork.

WRITE FOR INFORMATION

**GRUENDLER PATENT  
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905 N. Main St., St. Louis, Mo.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7

CHICAGO, ILL., NOVEMBER, 1922

No. 2

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*Published Monthly by*

**COMPLETE SERVICE PUB. CO.**

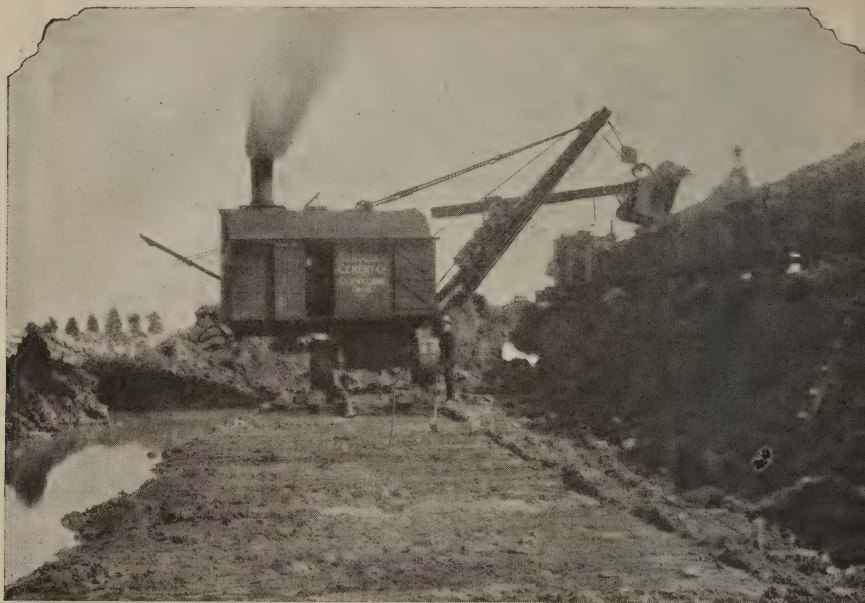
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## *All Seasons*

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"Sure we work all year around," said the runner, "why not?" Well, why not? The 3-A is a real shovel. The Sandusky Portland Cement Company depend on it to keep a big plant supplied with raw material, 1000 cubic yards of marl a day. It's sticky stuff in wet weather. In winter the frost goes deep. But neither condition can phase the Thew. It keeps right on digging and loading into the cars above.

This company has used a Thew in the pit for twelve years. They know it's the thing to do.

You can't go wrong on the 3-A. Write for YOUR copy of Bulletin 114.

THE THEW SHOVEL COMPANY  
LORAIN, OHIO

*Thew*  
*Power Shovels*

# Pit *and* Quarry

Vol. 7

Chicago, Ill., November, 1922

No. 2

## A Record Year

THERE seems to be every reason to expect that the production of Portland cement for the present year will go considerably ahead of any previous record.

The highest production so far recorded was in 1920, amounting to 100,023,245 barrels. The production of the present year up to the last of September was over 81,563,000 barrels, and a proportional estimate for the remaining three months of the year, based on the relationship which these three months usually hold to the first nine months of the year, would lead us to expect a total production for 1922 of about 110,000,000 barrels or practically 10 per cent increase over the former high figure.

This depends to some extent, of course, upon whether or not a reasonable supply of cars can be secured, both for the cement itself and for other materials required to mix with it. The sack situation is also becoming acute in some localities and lack of sufficient supply of sacks may reduce the total slightly. It would seem impossible, however, to think of any combination of circumstances which would cut down the production sufficiently to prevent us from having a record year.

In considering this large production of cement, it should also be taken into consideration that cement is never used alone, but always in combination with other pit and quarry materials, so that it will be reasonable to expect a record output in other branches of these industries as well as in that of Portland cement.

The preliminary figures of the Geological Survey, which it is hoped may be ready to be given out early in January, will be looked forward to with unusual interest. It is pertinent to suggest, therefore, that producers make no delay in sending in such returns as they are asked for, in order that the complete figures may be compiled as early as possible.

## Six by Nine

WHEN PIT AND QUARRY was established in its convenient 6x9 size, it was considered almost an outlaw in the publishing field, so far as size is concerned, and it had to fight several wordy battles, especially with advertisers, in order to vindicate the appropriateness of its size of page.

This is all past history, however, as the matter was considered settled long ago, especially when advertisers found readers were carrying PIT AND QUARRY around in their pockets and thus keeping in close touch with its pages.

Our judgment in this matter of size seems to have been justified by the fact that now more than sixty class publications have adopted the 6 x 9 form.

The latest of these is Engineering and Contracting of this city, who in the introduction of their new volume in October, came down from the so-called "standard" 9 x 12 size. In making this change, Engineering and Contracting says:

"The standard size of engineering text books has long been 6 x 9 inches, and the same is true of engineering



catalogs. This size has proved to be large enough for illustrations and tables, and it is really surprising, therefore, that it has not been already adopted by more 'class periodicals.'

"Ease of handling and filing, the fact that it will go into any bookcase, and will fit in any coat pocket, are the three features that appeal strongly to readers."

### Heavy Bond Issues

**S**ALES of long-term municipal bonds during September, totaled \$94,590,507 as against \$66,360,551 for August and \$88,656,257 in September, 1921. This represents the highest total value for the month of September, realized in any similar period during the last thirty years. The total for the nine months, \$905,770,787, represents the highest total for that period, since 1892. Short-term securities totaled \$47,831,000, of which \$42,410,000 was issued by New York City alone.

Records kept by the *Commercial and Financial Chronicle* further show that the number of municipalities issuing permanent bonds and the number of separate issues made during September were 442 and 615, respectively as against 516 and 663 for August and 377 and 478 for September, 1921.

Among the more important issues were: Chicago, \$8,095,000 4s at 98.639, a basis of about 4.16 per cent; Illinois, \$6,000,000 4s at 99.686, a basis of about 4.03 per cent; Detroit, \$5,009,000 4¼s; Missouri, \$5,000,000 4½s at par, plus a premium of \$32,215, equal to 100.644, a basis of about 4.35 per cent; Milwaukee County, Wis., \$4,300,000 5s at 107.36, a basis of about 4.20 per cent; Buffalo, \$3,580,000 4¼s at 103.109, a basis of about 3.90 per cent; Michigan, \$2,000,000 4s and \$1,000,000 4¼s at 100.012, a basis of approximately 4.08 per cent.

### Pay Loads and Dead Loads For Trucks

**E**VERY user of trucks knows that the loads vary in tonnage according to the size of the trucks so much so, that, in selling trucks, it is common to speak of them as two-ton, three-ton and five-ton cars.

For most heavy hauling, as with stone, gravel, sand and similar materials, a large capacity truck is used. This has brought the five-ton car into common use. Most trucks are built to carry an overload, so that many trucks carry loads up to six and seven tons.

This was excellent practice from an economical standpoint, for naturally the larger the pay load the more economical the cost of hauling.

This brings to our attention the hauling of loads over improved roads. With good roads it is possible to increase the size of the pay loads, but it has been found that the heavy loads that the large size trucks handle is very hard on the light surface that most states are building. This being the case, instead of building roads of such depth as will carry the loads that can be transported on modern vehicles, many states are passing laws limiting the size of loads.

Thus at least seventeen states are now forcing truck owners to carry a limited load. In most cases ten tons is set as a maximum pay load and dead load combined.

In order to enforce this law some states now have inspectors on the roads looking out for heavily laden trucks. When found the truck is stopped, weighing jacks are placed under each wheel and the total weight of the load is found. If the law is being broken, part of the load is taken off at once and the offender is summoned to the traffic court to be fined.

These facts show the need of great care in selecting the trucks when buying. If the maximum pay and dead

load is ten tons, then the dead load must be the minimum consistent with safety and low maintenance cost, in order to carry the maximum pay load.

Thus if a truck weighs five tons it can only carry a five-ton pay load. Add to the weight of the truck and the pay load is cut down accordingly.

However, it would be a poor investment to buy a truck built so light that it would be always breaking down under its load. The kind of truck to purchase is of ample strength and as light of weight as is consistent with safe operation. Then the maximum pay load can be hauled. This is what every truck owner desires.

These state laws will compel the truck manufacturers to redesign their machines so as to conform to the requirements of those states limiting the combined loads on trucks.

## Solving the Labor Problem

IN spite of the fact that there are still cries from many sections of the country of men being unemployed, yet many quarrymen know to their sorrow that they cannot obtain all the labor that they need.

Within a week of writing this article, one quarryman stated that if fifty men applied for work at his plant the next day he would gladly put every one of them to work, while in a new operation recently another pitman was attempting to unload a steam shovel with a foreman and two workmen. These incidents show how short operators are in some sections of the country.

An explanation of this lies in the fact that laboring in quarries is hard work, and in some branches is specialized laboring. The result is that many men are not trained to the work and after trying it for a few days move on looking for easier jobs. Then, too, with the prevailing prices paid for quarry products, it is not possible for

operators to pay men an extra high wage in order to attract and hold them. This means much in solving such a problem.

If workmen cannot be obtained, there is but one expedient for operators and that is to turn to machinery. Even in the smaller operations this will be found necessary.

## What to Do?

The following news dispatch, which appeared in the San Diego (Cal.) *Union* of Oct. 9, is typical of what might be written from many parts of the country:

El Centro, Oct. 8.—Members of the board of supervisors and county engineers yesterday visited the county's gravel pit at Frink, 15 miles north of Niland, to obtain a better idea what to do with the plant. The supervisors last week purchased the plant for the county from the county highway commission, after arranging for the discharge of the commission because its work in the county paving program has been completed.

Instead of purchasing its gravel for road construction from private companies, the highway commission bought the Frink pit and equipment outright, paying approximately \$125,000. Now that the road program is finished the supervisors are trying to decide whether to continue operating the gravel pit to procure material for road building and repairing, or to sell the plant to a private corporation. Engineers reported to the supervisors that it costs about \$100 a day to keep the plant in operation.

Under the law the supervisors can neither operate the plant and sell the product to the public, nor lease it and receive rentals for it, although it could be leased at a good profit to the county.

Sales of explosives in the United States during August for domestic consumption amounted to 603,842 kegs of black powder, 3,280,800 pounds of permissibles, and 18,114,953 pounds of other high explosives. These figures are based upon manufacturers' reports to the federal Bureau of Mines and represent about nine-tenths of the explosives industry.

## Angle Bars in Screens

**S**CREENS for rock crushing plants can and do in many cases regulate the output of the crusher. It is but natural that if the screens become full and choked they will not function and the crusher must be stopped until the screens can take care of the stone.

Thus a screen must be of a large size, for only a small part of a circular screen is used. This means that the diameter of the screen must be much larger than it would be if the greater part of the screen could be used.

It is but natural that a screen 5 feet in diameter should take more power to operate it, even without a load, than one but 3 feet in diameter. If it is possible to make the 3 foot screen do as much work as a 5 or 6 foot screen, then it is evident that the plant owner is getting efficiency and making a decided saving.

It is possible to materially increase the capacity of screens by putting angles iron in them.

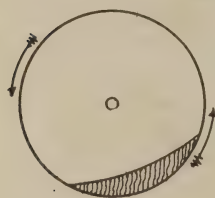


Fig. 1

It can be seen by Fig. 1, that with stone being discharged into the center of the screen, and revolving as indicated by the arrows, that the stone is carried up as shown by the hatching in the sketch. As soon as the stone gets to the highest point it slides back towards the center and it is by this action that the stone is kept in motion and is caused to be screened. The screens being divided into sections with different size rings and being on a slope, the stone moves forward through the different sections, thus being graded.

If too much stone enters the screen

it occupies the same area on the screen as the smaller amount, only it is deeper, thus the stone does not go through the screen faster, but if anything is slightly retarded, so that the screen can become choked.

To overcome this objection the stone must be spread over a larger area, and to do this the angles are placed in the

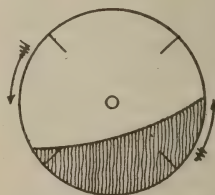


Fig. 2

by Fig. 2, more than one-quarter of the area of the screen will be taken up in screening stone and there will be some depth, yet the additional area will allow of this depth being taken care of without stopping the screen.

The angles should be from 3 to 4 inches deep so that they will be large enough to carry a bulk of stone on them. For this reason the angles must be well bolted to the screen. In spacing the angles they can be placed at the quadrant of the circle, or instead of 90 degrees apart two can be placed 80 degrees apart, leaving 100 degrees

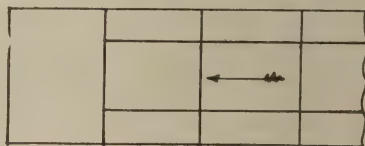


Fig. 3

between the two sets of angles. This spacing keeps the mass of stone together a little more than does the regular spacing. This latter spacing is all right for the larger diameter screens, while to place them on the quadrants is better in the smaller diameter revolving screens.

The angles should be placed in each section of the screen except the last

screens. These hold the stone so that it is carried up a quarter turn before it begins to fall back towards the center. Thus as shown



one. Here the largest size stones go and by the time the stone has reached this section most of it has passed through the rings. This is illustrated in Fig. 3.

If the fine screenings are to be separated from the dust, then a dust jacket should be placed around the first section of the screen which is graded for  $\frac{1}{4}$ -inch stone.

It is in this way that a set of screens can be fixed up to take care of a larger amount of stone. It also means that the stone is likely to be better graded, for the stone, as explained, will go over a larger area of the screen and instead of sliding so much on the metal it is carried up and dropped down.

Where washing is done in screens this is also a help in doing the washing, giving a much cheaper product. It is by these things that can be done for little money that a plant can be improved.

### Storing Stone at the Crusher

WITH a quarry opening located well up on the side of a high hill, more than one hundred feet in elevation above the crusher plant, which was situated alongside of a railroad siding, the operator used large cars and brought his blasted rock from the ledge to a trestle over the crusher, dumping it in a pile.

As there was plenty of room under the dumping trestle behind the primary crusher, the quarryman made use of this space by working his cars hard and storing uncrushed stone around the crusher. To him this seemed an excellent piece of business and he believed that it paid well, saying that if there was a temporary accident in the quarry so that stone could not be delivered, he had a reserve pile to keep his crushers going.

This was true, but it was the only advantage gained, and the advantage

was slight as compared to the extra cost that was added to his crushing. He was able to store about one hundred tons of stone in this manner and by so doing he made all his stone cost more.

First, he always had to use two men to feed his crusher. As he worked back into his storage pile he was compelled to use a third and sometimes a fourth man to use pick and bar to loosen the stone from the pile, so that the crusher could be kept going. Naturally in dumping the stone from the crusher it became packed into a tight, hard mass. Then, too, it was necessary at times to use men with wheelbarrows to bring stone from the back of the storage pile to the crusher.

When these things did not have to be done it meant that the operator had a hundred tons of blasted rock for which money had been spent for quarrying, tied up indefinitely. This alone meant an added cost to the stone.

From these things it can be seen that the added cost going on continually more than offsets any advantage that may accrue from overcoming a delay due to an accident in the quarry.

This shows that it would have been much cheaper to have built a chute or slide from the trestle to the crusher so as to prevent any rehandling or storing of the stone before being crushed.

It is safe to say, as a general proposition, that in crushed stone quarries all storage should be after the stone has been crushed. It can then be stored cheaper and is ready for sale at any time.

Herbert C. Follinger, manager of the Chicago office of the Chain Belt Company, died of pneumonia at his home in Chicago on September 27th.



Crushing Plant of American Gypsum Co. Machine Shop in Center Foreground

## American Gypsum Company Mining Rock of Big New York Deposit

**T**OWARDS the large end of the pear-shaped Akron gypsum "basin," located some 20 miles east of Buffalo, New York, is the mine of the American Gypsum Company. This Akron basin, the outlines of which have been fairly well defined by the sinking of shafts and core drill holes, is some 2 miles long with a maximum width of one mile. The deposit of gypsum, as mined, consists of a 4 to 5 foot bed of light colored crystalline or granular gypsum overlain by thinly bedded impure limestone 25 to 50 feet in depth. These limestone are in turn covered by a mantle of glacial clay ranging from a few feet up to 25 feet in thickness.

Analysis of various gypsum deposits in the state of New York, indicate that the gypsum content of the rock ranges from between the general limits of 65 and 95 per cent, gradually improving towards the western end of the sec-

tion, particularly in Erie county where the Akron basin is located. The rock in this part is also lightest in color and yields a plaster that is almost white. Analysis of material from Erie county discloses the following chemical constitution:

|                                |       |
|--------------------------------|-------|
| SiO <sub>2</sub>               | 0.51  |
| Al <sub>2</sub> O <sub>3</sub> | 1.19  |
| Fe <sub>2</sub> O <sub>3</sub> | .79   |
| CaO                            | 30.62 |
| MgO                            | 1.20  |
| SO <sub>3</sub>                | 43.59 |
| CO <sub>2</sub>                | 1.02  |
| H <sub>2</sub> O               | 20.52 |

99.44

Gypsum calculated..... 93.74

The impurities of the rock are what its stratigraphic associations lead one to expect. The principal foreign ingredients are lime and magnesia carbonates, quartz and clay with most of the iron shown by the analysis probably present in the clay. The high percentage of magnesia in the rock,

which is far in excess of the proportions found in dolomite, is quite a striking feature of the material, as it indicates the presence of free carbonate.

Theories on the origin of the gypsum formation are centered mostly around the belief that the deposits are the result of the evaporation of surface waters. The gypsum is hardly the result of the action of acid waters upon limestone, for the change from limestone to gypsum involves an increase of 90 per cent in the volume. This would hardly occur without general disturbance of the adjacent strata, but the beds of gypsum encountered are undisturbed, neither are they faulted or fractured so as to permit the easy circulation of waters.

The best explanation is that the Akron gypsum is the result of the evaporation of salt waters of an ancient sea, which also gave rise to the celebrated salt mines in this section of New York. The occurrence of shales between the layers of gypsum is accounted for by the supposition that the supply of salt water from which the gypsum was precipitated was cut off for a while, during which time the basins were probably invaded by land drainage and shales were accumulated in considerable thickness. The renewal of the early conditions with a fresh supply of sea water, started the precipitation of gypsum again, laying down that material that is found in the higher horizon.

The mine and mill of the American Gypsum Company are situated  $2\frac{1}{2}$  miles northeast of Akron on the boundary line between Genesee and Erie counties. The company owns mineral rights on both sides of the line, and has recently acquired other rights by the purchase of gypsum bearing lands from the Tonawanda tribe of Indians. These latter holdings will be developed by the sinking of a mine and the erection of a large mill.

The present mine is entered by means of a vertical shaft 60 feet deep which is divided into 3 compartments: one, 5x8 feet, for air passage and stairway, and two, 6x8 feet, for the balanced skips. The part of this shaft that is above the ground is entirely enclosed, and is a part of the mill building, entering the building at the ground level.

The most approved methods are employed in the mine to secure safe and efficient operation. The main haulage-way extends back about one mile. It is carried 6 feet high and is wide enough to admit of using the 2 feet of barren rock taken from below the gypsum bed for a supporting wall on either side. The rooms are driven 24 feet wide by 300 feet long, and have a height equal to the thickness of the vein, which is about 4 feet, running in some places to  $3\frac{1}{2}$ . Pillars 24 feet wide and alternating 40 or 60 feet long, are left, each being supported by a 20 foot crosscut.

Drilling at the places is done by Scranton electric rock drills, which are kept operating continuously during the day time while the men are loading cars close by. The holes are loaded and shot at night, bringing down sufficient material for the next day's operation. Large stones are sledged or broken by Ingersoll-Rand jack-hammers supplied with air from Ingersoll-Rand air compressors, mounted on mine car trucks and connected to the electric line used for lighting the mine and operating the trolley haulage system. This portable compressor outfit is a very convenient piece of equipment around the mine. It may be brought to any place it is needed without delay, and furnishes a steady and reliable supply of air for the satisfactory operation of the hammers.

The stone is thus, whether by blasting, sledging, or use of air hammers, reduced to one-man size, and of proper weight and dimensions to be put into





Crushing Plant of American Gypsum Co., from Mine Side

the mine cars by the workmen. These men work on a contract basis, as do the loaders in all the other New York gypsum operations.

The material is loaded into low built mine cars of two tons capacity each. These cars when loaded are brought to the main haulageway where they are made up into trains and picked up by either one of the company's two 5-ton Goodman locomotives. These locomotives, which operate from a trolley, take care of all the work of moving gypsum toward the shaft.

When the trains of loaded mine cars

reach the shaft they are dumped by machinery installed by the Car Dumping and Equipment Company. This equipment discharges the stone into skips of 2 tons each, handling this work with dispatch and permitting speedy hauling back of empty mine cars.

Loaded skips are hauled up the vertical shaft by a 2-drum hoist made by the Buffalo Hoist & Derrick Company, and located in the mill building near the head of the shaft. Brought to the top of this shaft the skips are automatically dumped, each skip as it comes along raising the gate on its side of the shaft and dumping the load of gypsum rock at the primary breaking machine.

This primary breaker is a Jeffrey hammer mill which, after reducing the stone, passes it to a shaking screen.

that separates the material at  $1\frac{1}{2}$  inches and  $\frac{5}{8}$  inch and scalps out the oversize for return to the crusher.

The dust arising from the grinding is disposed of by a blower made by the Buffalo Forge Company, which discharges into a dust collecting system where dust and air are separated.

When storage bins are filled with stone the material reduced by the crusher is taken off by a screen conveyor located below the shaking screen and passed to a storage pile across the loading track from the plant. Reclaiming here is handled by

a steam derrick with one large clamshell bucket. A Sauerman LeClaire scraper is used for bringing material within the area in which the derrick operates. With this equipment cars are loaded quickly.

When it is necessary to load box cars from the bins in the mill building, the work is handled by 2 Fairmont car loaders, which are run into the center of the car and extend out to the open side door. At this door end of the loader the device is supplied with gypsum which is conveyed to the other end of the loader and thrown sideways through the air to either end of the car, which it soon fills up as far out as the doors.

Loaded cars are drawn over a Fairbanks track scale where they are weighed before being picked up for hauling to the main line. The plant is served by the West Shore Line of the New York Central, which has along its right of way a number of gypsum plants. Among these is the Phoenix Gypsum Company, Wheatville, N. Y., which is under the same management as the American Gypsum Company. The spur track to the West Shore Line is about one mile long.



Cars, Loaded from Bins or Stock Pile, Are Weighed on a Fairbanks Track Scale



Sauerman-LeClaire Scraper Used on Stock Pile



Transformer Building and Storage House



The Akron plant of the American Gypsum Company has a capacity of 750 tons for 8 hours' operation, and averages continuously about 600 tons for that period. Material is all sold in crude form, principally to cement mills, some of it for calcination and later making into plaster.

The plant is electrically operated throughout on current from Niagara Falls, which is received at 11,000 volts and transformed into 440 volts. An amount is regenerated and supplied as direct current for use in the mine by the trolley locomotives and the drills.

Provision is made for fighting fires by the installation of a Gould pump driven by a 50 H.P. motor. This pump is connected direct to the waste water line from the mine, and is capable of supplying a continuous stream that would permit the easy conquest of any fire that might break out around the mill or shaft.

The mine is drained by 3 Gould centrifugal pumps, all discharging in the same waste water line. This waste water is disposed of at ground level by taking advantage of the natural lay of the land, which permits its being quickly run off.

The American Gypsum Company maintains offices in Rochester, N. Y., where the president of the company, Mr. Harry C. Nobles, has his headquarters. The plant at Akron is under the charge of Mr. L. E. Chamberlain, superintendent, who also supervises the operations at Wheatville, N. Y., where the Phoenix Gypsum Company is located.

### Keeping Quarry Floors Clean

**A** CLEAN quarry floor is an asset. Besides, a floor covered with blasted rock is an ugly sight, and a reflection on the management.

Today with many machines that must be used in a quarry, it being necessary to move these heavy ma-

chines over the floor from time to time, a floor all littered up with blasted rock and other materials and piles of stripping debris, is a detriment to economical operation.

The writer has seen quarries in such bad shape that it has taken a large crew of men considerable time to move rock just to lay a new track, and much of this rock had been rehandled several times for the same purpose.

If for no other reason than for track laying and hauling with vehicles and moving machines over the floor, it should be kept clean, not only of loosened material but also of hard, uneven bottom.

Ridges and lumps are frequently left by blasts so that although there may be little loose material on the floor, yet it is rough and in bad shape for any use. A floor should not only be clean, but also smooth and kept in such shape as to drain easily.

With loose material scattered all over the floor, it means the waste of much money. All such material has been stripped and blasted, and this may mean quite an investment.

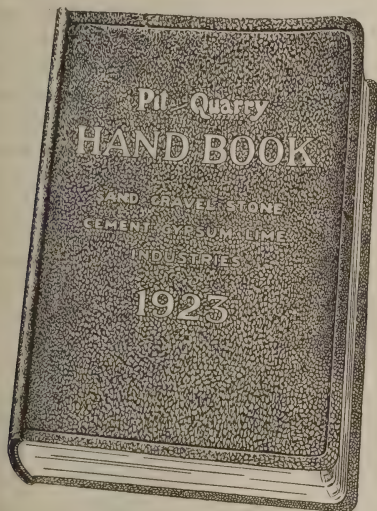
In one large quarry visited a few years ago the writer was called upon to estimate the loss of money due to the floors being littered with rock, and found that at the current prices then being paid for rock, there was on the floor at least seven thousand dollars worth of material. It was not possible to tell just what sum of money had been spent to throw this rock down, but if it had been picked up and crushed it would have sold for seven thousand dollars. This would have meant a nice addition to the operator's income for that year.

Thus it can be seen that a floor all littered up with rock is not only a detriment in operating, but it means that the operator has much money tied up in the material on the floor. Surely it is worth while to get the use of the money so held up.



## They Like Our Hand Book Idea

A month ago we mailed out with PIT AND QUARRY an announcement of the early publication of a hand book covering the industries represented by this journal. While we have been at work on this book for some time, this was the first news of it given out to the trade, and the results have been more than gratifying. Not only are producers in large numbers filling out the card which asks to be put on the mailing list for the book, but the immediate demand for catalogue space, by manufacturers and others supply-



ing this field, has been remarkably encouraging, showing unmistakably the need for such a book in the pit and quarry industries.

It is intended that the book shall cover the following:

### STANDARD PRACTICE

A treatise outlining the standard methods of operation in each of the industries covered.

### STATISTICS

Showing production, distribution, use, average price, etc., of pit and quarry products.

### MAPS

Showing distribution of materials and location of plants.

### CHRONICLE OF EVENTS

Record by months of the principal happenings of the past year in the pit and quarry industries.

### ASSOCIATION DIRECTORY

Giving name, location and officers of the various trade organizations in these industries.

### WEIGHT AND BULK OF MATERIALS

Tables showing weights per cubic yard, and yardage per ton; also angles of repose, and other constant factors.

### FREIGHT RATES AND TRAFFIC REGULATIONS

Including Loading, Demurrage, Switching Charges, etc., in the several freight territories.

### HIGHWAY SPECIFICATIONS

Digest of such specifications so far as they relate to mineral aggregates.

### INSURANCE RATES

A digest of rates on fire and marine insurance.

### LIABILITY INSURANCE RATES AND TERMS

Rules in force in the principal producing states.

### EXPLOSIVES

Rules regarding transportation and storage.

### KINKS

A "how to do it" department, giving methods which many producers have found effective.

### SAFETY

Principal provisions of codes which have been recommended or adopted.

### FIRST AID

Giving means of rendering quick assistance to wounded men.

### GLOSSARY OF TERMS

A full glossary of words whose chief application is in the pit and quarry field.

### CATALOGUE

This section will represent the leading manufacturers of machinery and equipment, and will be so classified as to be readily accessible. An alphabetical index to this section will also be provided.

### LIST OF TRADE NAMES

Arranged alphabetically so that the manufacturer of any branded equipment can readily be traced.

Those who have not already made application for the book should do so at once, so that a sufficient number can be printed to meet the need. Make application on the post card accompanying this issue.

## Addenda

In the October issue of Pit and Quarry we neglected to state, as part of the story on the American Cement Plaster Company, Akron, New York, that the trolley locomotive used in the mine was made by the Goodman Mfg. Co., of Chicago, Illinois. The Goodman locomotive used in this mine has been giving very satisfactory service ever since it was first installed. It encounters some stiff grades, pulls trains of cars that are quite a bit above its rated capacity and operates continuously through the 8-hour mining period.

# Institutional Management for Business

The Fifth of a Series of Articles

“**W**HERE do you house your men?” asked a visitor of a quarry superintendent.

“Down at the foot of the mountain in those box car bodies,” replied the superintendent pointing in that direction.

There were four bodies of some old box cars, unpainted and patched up so as to convert them into homes for men. From six to eight men were living in each old car.

Homes! They could hardly be called that, yet the men were compelled to live there or else seek jobs elsewhere. Little wonder that many of them did and that it was difficult to hold men in this quarry.

One would not have been surprised to have found such conditions in a small quarry operated by an individual with little money or capital; but the quarry in question was one of a company operating a number of large crushed stone quarries.

This example may be an extreme case, and it is cited for that reason; yet it is true that many quarry operators pay but scant attention to how their workmen are housed, and in a large number of cases, when it is necessary for pit and quarry owners to have buildings to take care of their men, that very cheap and uncomfortable houses are built and little attention is paid to sanitation.

What is the result? The best men go elsewhere to obtain employment, where they can have a comfortable house. Into a squalid camp or village few men will bring their families, so that those who seek employment are generally floaters—here today and at another place on the morrow. The result is that indifferent work is done and the operator is generally short handed, and has continual labor troubles.

If men are to consider a business

organization such as a stone quarry or a sand or gravel pit an institution for which they can work for a long term of years and possibly for a lifetime, there must be a common interest between the employer and employee that must reach more than through their work and even the pay envelope, into the workmen's homes. This is always possible even if the employer does not furnish the homes to his workmen, and is much more so when the employer furnishes the home.

One of the troubles today that exists in the coal mining field is that the operators have been indifferent to the interests of the miner and there has been little if any influence exerted by the employers in the homes of the miners. Where there has been you will find better satisfied workmen. A squalid home is not apt to engender any kindly feeling towards others and especially towards those who are held directly responsible for the conditions that exist.

It has already been stated in this series of articles that “it is an employer's duty to see that his employees can spend their money properly and that they get value received for their dollars.” This applies to house rent just as much as purchasing food and clothing. Thus if an operator's workmen rent houses from others, the employer should be interested to such an extent as to see that the rent is a fair one and the conditions of the houses are the best obtainable in that locality for the money.

A landlord may be unwilling to do much for the ordinary tenant, but for an employer of a large number of renters he is bound to take a different attitude, for he knows such a man can give him renters when they are difficult to obtain, and if he fails to treat



tenants properly that he will lose them when it is possible for their employer to get other houses for them. An employer who will look after such things will be building an institution of his business and for his men, although he may not realize it. The employer may not have time to look after such things personally, but a clerk, timekeeper, or paymaster may be delegated to do these things, the employer only giving supervision and his personal attention when absolutely necessary.

If it is possible to better the conditions under which workmen must live when they are renting from others, it is certainly the duty of an employer to see to it that his workmen are housed properly when he himself is the landlord. Then the entire responsibility rests upon the operator and he cannot shirk it if he is to make his business such an institution as his employees will rally to and so cooperate as not only to make the business pay, but to grow from year to year.

It should be evident to any employer that to house men in an old box car is not inviting men to work for him. Nor to build rough wooden shacks, or house his men in an old barn, is not good advertising in the labor market. These may be temporary expedients in starting business that men will overlook, but to continue their use is a great mistake.

Expensive houses need not be built; but well planned, comfortable houses that can be stained or painted should be erected. A porch not only adds to the appearance of a house but much to the comfort of the occupant.

Plenty of light should be furnished, and besides good ventilation the houses should be arranged so that they can be easily and cheaply heated.

Running water can often be put into such houses without great cost, for in many cases pumps must be operated to unwater pits and quarries, pumping both day and night; and although this

water may be unfit for drinking purposes, yet it may be used for all other things. This may even admit of bathtubs being placed in the homes of the workmen.

Such homes as these may be built for little more than the sordid shacks frequently seen, and no self-respecting workman would hesitate to take his wife and family into such a house.

Each house should have a plot of ground around it that should belong to the renter. This can be used to raise vegetables and also for some flowers and possibly a grass plot. A few shade trees would add to the beauty and comfort of the village.

If the operator keeps his property clean it will act as an incentive to his workmen to follow his example. In fact it is possible to arouse friendly competition among the tenants to keep their places clean and beautify them. Prizes can be offered for the best kept lawn, raising the greatest variety and prettiest flowers and also the best vegetables.

Twenty-five dollars spent in such a contest would do much to create an interest in the men's homes, and the awarding of these prizes in the autumn would furnish the occasion of a social among the tenants to be held at the recreation center.

Streets with paths and roadways can readily be built and kept in good order with the refuse from the quarry or gravel pit.

The fact is that if an operator shows an interest in these things that many of the best workmen are always willing to spend some of their own time and money to make other improvements around their houses.

It is to this class of men that the employer wishes to appeal. Such men take an interest in their work and will stay with the same employer for years. In the home building the woman must be considered. A man's wife will hold a man much longer on a job than he



may care to stay himself. The woman is the real home builder. Her instincts are along this line. She not only wants a place neat, but with some touches of beauty about the premises. More educational work to hold men on their jobs can and should be done among workmen's wives than with the men. The women can prevent strikes. They will keep the men satisfied if they themselves are satisfied.

Most employers have overlooked these facts. See that the women understand a new method of paying, or arrangements for educating her children, and she will see to it that her husband and sons are in favor of such things. Make the recreation center hers as well as the men's and the center will be used to the best advantage and be a co-operative influence for good for both employer and employees.

Arrangements must be made to send the children of workmen to school. If a school house is not within walking distance then a conveyance of some kind should be provided. In many states if an employer arranges for such a conveyance the cost of operating it will be borne by either the state, county, or town, thus relieving the operator.

The cost of all these things can be included in the rental charged, provided the employer is satisfied to earn only a fair interest on the money invested. If he is looking for a large profit, the workmen will not stand for it. If an employer wishes to build an institution to which his men will prove loyal he must be loyal to his workmen and show them by both word and deed that he has their welfare at heart.

In considering homes for men, those must be considered who have no families or are separated from their families. This means at least one house built and arranged for a boarding house. It is a mistake to try to con-

vert an ordinary dwelling into a fair sized boarding house.

The men must be housed and fed well and this is a part of the duty of the employer as outlined in a former article on Institutional Management. In the same article recreation centers were also discussed.

Where men must be housed in pit and quarry operations there is no reason why there should not be a real village built, with the company store as a center. The recreation center can become more than a place of amusement and pleasure, for it can be used as a school during the day and on Sunday as a place to hold religious worship.

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## Fluorspar Investigations

The importance of fluorspar in the steel and ceramic industries is so great, and accurate information on methods of mining, milling, and utilization, and on costs of production and possibilities of future production is so lacking, that it has been considered advisable by the Bureau of Mines to investigate all phases of the fluorspar industry in the United States. At the request of, and in company with several eastern fluorspar producers, examination has been made of the principal fluorspar deposits of the western states. This examination was followed by an intensive study of the producing mines in Illinois and Kentucky. It was found that most of the deposits in the far western states were small and could not be relied on to produce much surplus over the needs of the western states. Costs of production in the Illinois-Kentucky field have increased greatly, owing to the increasing depth of the principal mines, the large amount of water that must be pumped, and the increased costs of labor and supplies. A report on all phases of the fluorspar industry is in preparation.

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The Concord Lime Co., of Knox County, Tenn., has been incorporated with a capital of \$10,000. Incorporators: H. G. Winfrey, M. L. Winfrey, O. L. White, C. H. Winfrey and Ruth E. Winfrey.



Handling Material by Belt Conveyors

## Excavate Sand and Gravel Along the Ancient Illini Trail

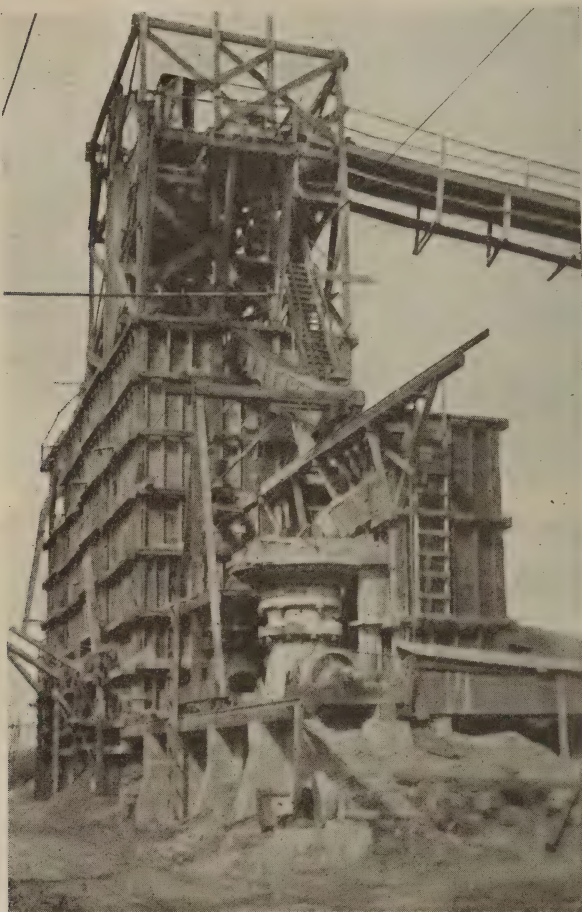
THE plant of the Moline Consumers Company near Ottawa, Illinois, has been in operation for some five or six years, producing sand and gravel for markets located mostly to the west. The method of operating involves excavation by a hopper dredge, conveying over considerable distance to the plant, and washing, screening and crushing at the plant.

The material that the plant is producing comes from a deposit that has a quite high proportion of large material, some of it tightly cemented. The material is strong and passes highway tests very well. It is covered by a light overburden which is worked back from the gravel face by a crane equipped with a scraper bucket. The age of the material is questionable, but probably does not belong to the early Wisconsin Age, which outcrops in numerous places along the bluffs of the Illinois River. Deposits of this

early Wisconsin gravel are found near Utica, LaSalle, Spring Valley and between Depue and Bureau, and south of Bureau on the west bluff of the Illinois, all of which are thought to have originated with the ice advance of the early Wisconsin stage. The material in the deposit in question is very likely later Wisconsin gravel which in the main is that found within the valleys and is of two sorts—that under the terraces and that which forms part of the valley filling. The material under the terraces is thought to be of glacial origin at least in part, and to have been formed when the ice edge was not far to the east of this region. The gravel forming part of the valley filling is possibly of more recent origin, having been deposited after the Illinois valley ceased to be the outlet of glacial Lake Chicago.

The pit from which the gravel is being taken is assured at all times of a steady supply of water by seepage





Two No. 5 Allis-Chalmers Gyratory Crushers Are Used

from the Illinois and Michigan Canal, which is located within a stone's throw of the pit. Were the material of suitable character for pumping, this water supply would give a splendid opportunity to use pumping methods to advantage. But the other requisites for a successful pumping operation are not present at this deposit, and their absence illustrates how seldom the average producer enjoys all the natural requisites for one form of excavation or another. He may have fine material and not enough water or plenty of water and material that is

too tightly cemented or has too many boulders. At the Moline plant there is plenty of water for pumping, but the material is too hard. Parts of it, in fact, give the dipper dredge just about all the work that it can handle.

This dipper dredge is a piece of equipment of the Company's own manufacture. A scow was built at the plant and on it was mounted an American Hoist & Derrick Company's derrick and a Thomas hoist. A  $\frac{5}{8}$ -yard bucket is used and power furnished by electric motor.

The material excavated by this dredge is dropped into a hopper mounted on a scow that is kept at all times lashed alongside the dredge. At the upper part of this hopper is a bar grizzly spaced 8 inches. This grizzly is quite an essential part of the equipment, for a considerable amount of

oversize material is knocked off at this point. The hopper operates without automatic feeder, discharging upon a belt conveyor running direct to another belt conveyor, the end of which rests on a small strip of land. The length of the conveyor running from the hopper to this second conveyor is adjustable and can be arranged to reach out in all directions from the strip of land on which the stationary conveyor terminates. In this way, operations can be extended in all directions with a minimum of alterations. When it is desired to



start the dredge digging at any point, it is necessary only to draw it over, anchor it by the spuds and then swing the hopper alongside. This movable belt conveyor is 24 inches wide and at the present time 50 feet in length. The length of this conveyor may be changed at any time to conform to digging requirements. A good illustration of the manner in which this floating conveyor is used to work the deposit out in the form of a horseshoe around the end of the first stationary conveyor is given in one of the accompanying pictures, which shows also the Illinois and Michigan Canal in the background.

The first stationary belt conveyor is 225 feet between centers, and is equipped with a 24-inch belt. This belt discharges to a small hopper from which another belt conveyor running direct to the plant takes off its supply



Screening, Washing and Crushing Plant

of material at the bottom. The first conveyor raises the material a few feet in height during its trip from one end of the belt to the other. The structure on which this first field conveyor is built is of piles driven into the gravel at the bottom of the pit. In this regard it differs from most field conveyors in use around gravel pits. Usually the field conveyor is made to run around the edge of the pit. The structure supporting the field conveyor also serves the purpose of a support for the electric feed lines running out to the dipper dredge and the floating conveyor.

After the gravel has dropped from the hopper below the field conveyor, it is taken up by a 24-inch belt conveyor, 457 feet between centers and operating at an angle of 10 degrees. Under this big conveyor, rollers are set 4 feet apart. Few idlers are used, the belt holding itself well in position over its entire length, by the loaded trough. Alongside of this long conveyor is a walkway extending from the top of



Morris 6-inch Pump

the plant to the ground level.

The long plant conveyor belt discharges at a hopper in which the gravel meets a stream of water by which it is washed and flushed down to a series of 4 Dull screens 53x82x30 inches. With these screens are produced three sizes of gravel and one of sand.

Oversize that is thrown out by the screens drops to a grizzly, which separates this material into 2 lots. Of these two lots the larger oversize goes to a No. 5 Allis-Chalmers gyratory crusher, and the smaller oversize to another Allis-Chalmers machine of the same size. This arrangement of crushers is found very convenient when it is necessary to repair one or another of the machines. At such times the plant runs ahead without interruption, one crusher temporarily doing more work than usual.

The crushed gravel as it drops out at the bottoms of the crushers is fed by chutes to a belt conveyor 20 inches wide and 165 feet between centers, which carries the crushed product to the large 24-inch plant conveyor belt that brings the material to the plant in the first place. This crushed gravel conveyor is powered by an electric motor at the head pulley. It feeds the plant conveyor belt through a chute which spouts the material in the center of the trough as illustrated in one of the photographs.

After the material passes the screens it goes to storage bins of 350 tons capacity each. The material is drawn off from these bins at the side through Dull bin gates. Loading is done directly to Rock Island cars or to cars of the electric interurban line which runs by the plant and has at the plant a flag station known as Gravel.

Sand is washed and separated by Dull settling tanks, and is then passed on to sand storage bins. The amount of sand obtained at this plant does not

run nearly as high as in most plants in the Middle West.

Water for the washing operations is furnished by a 6-inch Morris centrifugal pump, belted to an electric motor. The water is taken up at the corner of the pit close by the plant, and, after use in the screens, is run off in flumes to a settling basin from which, when clarified by settling, it flows back into the pit.

Individual electric drives are used throughout the plant. General Electric motors are used exclusively together with starting equipment furnished by the General Electric Company. Central station power is brought in at 33,000 volts and transformed to 220 volts.

To insure good light when the plant is running at night, "flat cone" reflectors made by the Benjamin Electric Company of Chicago, are located in a number of positions. These reflectors are placed above the screens and crushers, and at the points where the field conveyor and the crushed gravel conveyor discharge onto the long plant conveyor belt. They are also used in a number of places on the dredge.

This plant was designed by Raymond Dull, and contains considerable machinery developed by him and made by the Weller Mfg. Co., of Chicago.

The operation of the plant is superintended by Mr. Oscar Johnson, a sand and gravel man of long experience.

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The Syracuse Sand Company has been incorporated at Syracuse, N. Y.

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The first carload of gypsum mined by the Imperial Gypsum Co., San Diego, Calif., was shipped in September to a Los Angeles firm. This company was organized two years ago, and has built a 25-mile railroad from the San Diego highway to the company's mines, where immense deposits of gypsum are located. The company has established a mill at Maria, Calif., and the gypsum is hauled down the railroad to the mill, where it is crushed and loaded on cars for shipment.





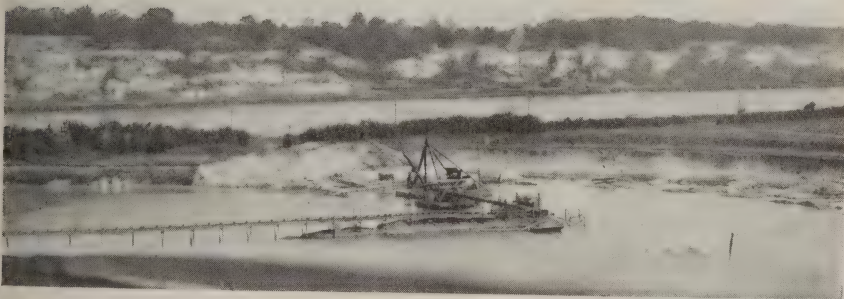
General View of Plant of Moline Consumers Co., Showing Dipper Dredge in Foreground



Looking Down Plant Conveyor. Crushed Stone Belt Discharge Part Way Down



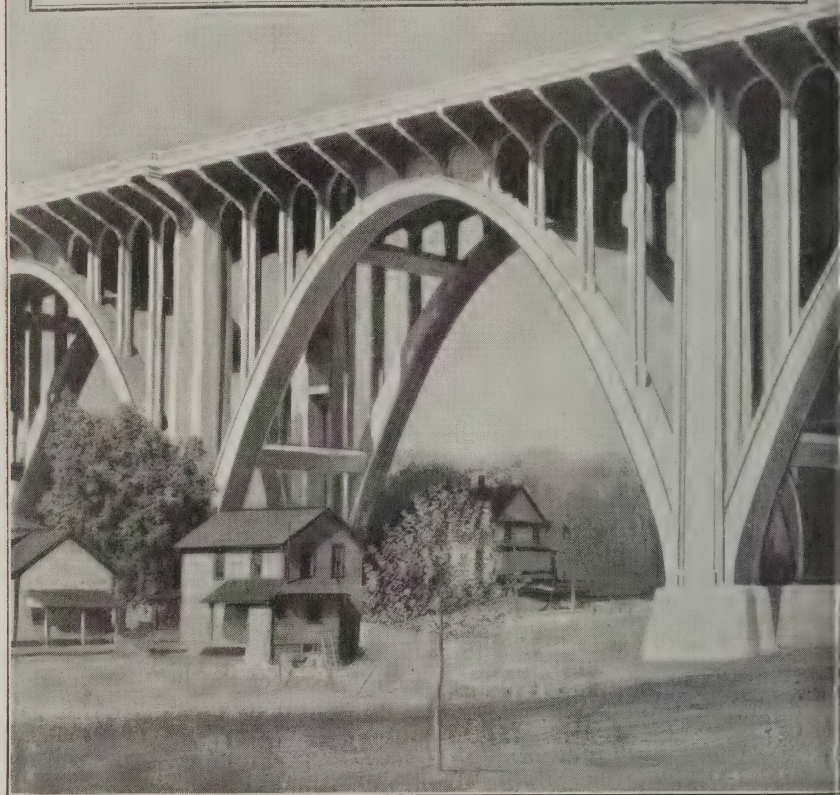
Part of the Dull Screening System



Dipper Dredge and Field Conveying System. Illinois and Michigan Canal in Background

# PLYMOUTH

*Gasoline Locomotives*



North Hill Viaduct, Akron, Ohio, Constructed by James O.

James O. Heyworth, Engineer and Contractor, Chicago, completed in August, the above viaduct of which the following data indicates its magnitude:

DATA—North Hill Viaduct, Akron, Ohio. Work begun June, 1919. Completed August, 1922. Total length, 2,810 feet. Maximum height, 135 feet. Number of spans, 16. Two concrete approaches—North, 148 feet; South, 167 feet. Arch spans vary, 116 feet to 191 feet. Concrete used, 57,000 cu. yds. Reinforcing bars, 2,500 tons. Width of deck, 72 feet. Ten-foot sidewalk each side. Roadway between curbs, 52 feet. Double track in center for street railway traffic.





and General Contractor. For Magnitude See Data Below.

Mr. Heyworth writes: "All concrete in job, except small amount going direct into forms, was handled from mixing plant to structure by three 3-ton PLYMOUTH Locomotives. Service given was very satisfactory."

That's glory enough. Ask us for literature.

**THE FATE-ROOT-HEATH CO., Plymouth, Ohio**



Grinding and Calcining Plant  
From Top of Crusher House



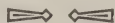
Trestle Between Mine  
and Mill. Adit in  
Background



Mixing and Calcining  
Buildings from B. R.  
& P. Tracks



Cars are Dumped at  
Crusher on Rocking  
Tipple Operated by  
Lever in Foreground





## Complete Gypsum Mining and Milling Operation

THE gypsum deposits of western New York, which occur in the Salina formation of the Silurian system, form a continuous belt of material from the Niagara River to Syracuse, maintaining an average width of 7 to 10 miles. The Salina formation includes also the rock salt belts of the state, these occurring about the middle of the section, most notably at the town of LeRoy.

In this extensive area are a number of grades of gypsum, ranging through various degrees of hardness, and permitting the manufacture of a number of qualities of plaster.

The first or top number of the Salina formation is the Bertie limestone, a more or less magnesian stone of quite uniform character, extending from the province of Ontario, where the type locality is found, eastward as far as Schoharie county. It serves as a very useful surface indicator of the presence of gypsum, for the main gypsum beds are not far below it in the shales. Underneath the Bertie limestone occurs the Camillus shale, including a considerable thickness of soft shale containing intercalated layers of magnesian limestone. The workable gypsum beds are found in this shale at different horizons, many near the top. The color of the shales is commonly drab or grey, but varies to olive green and in some places to red. The thickness of the shale, together with the gypsum beds, averages perhaps 300 feet in the central part of the state. The gypsum deposits are divided into separate beds by seams of shale, although there is no regularity in the number of thickness of the beds. The gypsum is usually found near the top of the Camillus shale.

Not far from the center of this

interesting formation, are located the mine and mill of the Empire Gypsum Company, Inc., situated southeast of Garbutt Station on the B. R. & P. and Pennsylvania railroads. The gypsum here averages about 6 to 8 feet in thickness, the middle two feet of which appear to be the best quality and the lower two feet considerably harder. A good limestone roof runs over the workings, which are underlain by 10 feet of limestone. Underneath this limestone foundation is a second bed of gypsum which the company has not yet developed, but which may at some time be reached from a lower level. It is calculated that the mine can furnish gypsum for the next 80 years.

The main tunnel runs back about  $1\frac{1}{4}$  miles from the mine at an average depth of about 60 feet. At the present time the company is working 10 places, and employing about 30 men at drill running and car loading. The mine is one of the roomiest in the western New York district, the tunnels never running less than 5 feet and in some places going up to 9, with the average height before mentioned of 6 to 8 feet. It is comparatively quite a dry working, and the matter of drainage does not present any particular problem. The work of drainage is handled by a Gould pump with a second Gould 4-inch centrifugal pump for boosting to ground level.

The method of securing the gypsum is quite the same as that employed in the other New York mines. Drill runners are kept working continuously with Scranton rock drills, one at each face, boring a  $1\frac{1}{2}$ -inch horizontal hole about 8 or 9 feet in length. These holes are loaded with dynamite and shot each night, after the men loading



"Tramp" Iron Removed by a Dings Magnetic Pulley

cars have quit. This method brings down a considerable part of the stone in one-man size. Occasional large stones are reduced by sledging or by the use of air hammers operated from compressors mounted on mine car trucks and powered by electric motors connected to the same direct current electric line which feeds the motors of the Scranton drills. With these methods the company is able to accomplish daily the loading of as many as 200 mine cars of  $2\frac{1}{2}$  tons capacity each.

As cars are loaded at the places, they are picked up by a Mancha Mule. This battery locomotive haulage is used only for this work. As the locomotive hauls away the loaded cars, it drops empties for filling, drawing the full cars to the main tunnel and up to a point about a mile back from the entrance of the mine where a trolley system begins.

Loaded mine cars are made up into trains of about 15 cars each, and hauled to the mill by a  $4\frac{1}{2}$ -ton General Electric locomotive.

The trolley locomotive pulls its train as far as the trestle shown in one of the photographs, just outside the entrance to the mine. From this point on the work may be said to have been transferred from the mining to the milling department.

The cars are pulled up to a tippie by a cable running from a single drum hoist made by the Buffalo Hoist and Derrick Co. The operation of this hoist is in charge of a man who also acts as scaleman, weighing each car as it comes along on a Howe track scale, and taking off car loaders' checks.

Cars are of the end-dumping type and are made to discharge on a rocking tippie by a chain and hoist operated by a lever. As the cars dump they are allowed to run out on the trestle, where they are sent by a spring switch to a track beside the one on which the loaded cars are standing. As the empty car runs out on the trestle, it carries the cable to a point where it is hooked to one of the loaded cars. On the return track empty cars are made up into trains and are picked up by the trolley locomotive and returned to the mines for reloading.

At the tippie stone is dropped from above to a No. 14 Traylor gyratory crusher, located below grade so that it is unnecessary to raise the stone from the level of the trestle between the mill and the mine entrance. Because of the necessity of reducing the stone to fairly small size for loading, most of it enters the crusher without bridging, and the primary breaking operation is therefore quite an easy one. This primary crusher discharges at the foot of a vertical chain bucket elevator with buckets 18 inches wide. This elevator, which is 50 feet between centers, raises the stone to a point 5 feet above a belt conveyor running to the grinding and calcining plant. The material drops by chute to this conveyor which is 14 inches wide and 200



feet between centers. This conveyor belt runs in an enclosed gallery.

The primary crusher and the vertical chain bucket elevator are driven by a General Electric motor through a line shaft; that is to say, an extension of the crusher shaft constitutes a line shaft from which the elevator is driven by chain through beveled gears. The belt conveyor is powered at the tail

pulley by a General Electric Motor.

At the discharge end of this conveyor belt is a Dings magnetic pulley. This device performs the office of a protector of the machinery that is used in later parts of the process. It takes out all tramp iron that may get into the rock down in the mine, or during the time that it is in the cars. Inspection of a pile of metallic refuse underneath the conveyor shows railroad spikes, nails, broken bits of castings and tools that if not removed might work serious harm to the grinding machinery.

The belt conveyor carrying the stone from the primary crusher after it passes the magnetic pulley, discharges over a woven wire screen, with  $1\frac{1}{2}$ -inch openings, set at an angle of 45 degrees. The material that goes through it passes direct to the dryers, and the stone that is rejected drops to a Butterworth & Lowe "cracker." The product of the cracker follows the same course as the fines from the wire screen, going by elevator and conveyor to the dryers.

In the dryers, which are 30 feet long and 5 feet in diameter, made by the Ruggles-Coles Engineering Co. of New York City, there is removed all natural moisture of the stone that is acquired in the mine and any increased



Butterworth & Lowe "Cracker" Reduces Stone to Right Size for Rotary Dryers

moisture that it may have gained in exposed positions as it goes to the mill.

The work of processing gypsum rock is next taken up by three Raymond mills, which receive the stone from the dryers and reduce it to the degree of fineness desirable for calcination. The material as it comes from the Raymond mills is elevated by blowers and passed to bins from which the kettles are fed.

Three kettles, made by the Des Moines Manufacturing and Supply Co., take care of the work of calcination. A fourth kettle has just been added. It was not yet in operation at the time the accompanying photographs were taken and the smokestack which serves it was just being hoisted into place. It has since been put in service and is now working with the other kettles. This kettle has a stack of its own, while the other three kettles are served by one large stack.

After calcination, the gypsum is dropped at the back of the kettles to the level of the kettle firing floor, into a long trough running parallel with the battery of kettles, in which trough is a screw conveyor. This screw conveyor carries gypsum to a vertical elevator which passes on to another screw conveyor. This last serves the mixing plant through a gallery con-

necting the two buildings and housing also a communicating walkway.

In the mixing plant gypsum is passed by systems of chutes and screw conveyors to the mixer bins and to the board and block plants. The material intended for mixing with fibre and retarder is spouted into large conical hoppers above the mixers. These hoppers are designed to operate in conjunction with a Howe scale. Gypsum is thus weighed out accurately into batches, and the exact amount of retarder necessary for the particular batch being made is here added. The wood fibre or hair is also put in at this point. The wood fibre used is mostly poplar and basswood obtained from around the plant and shredded to the necessary fineness by the company's own machines. The stucco, with the retarder and fibre are passed down to the lower half of a Broughton mixer, in which they are thoroughly worked together. The product is then taken off in wire-tied cloth bags.

The plain stucco without hair, fibre or retarder may be drawn off from one of the bins in the mixer building. Provision is also made at an earlier part of the process to draw off ground raw gypsum for use as land plaster.

Adjoining the mixing plant of the Empire Gypsum Company, Inc., is a block plant belonging to the Ebsary Gypsum Company, which operates on gypsum taken over by a screw conveyor, after it has passed through an automatic scale made by the Richardson Company of New York City. This scale weighs out the gypsum as it comes along and passes it on in batches to a screw conveyor running to the block plant. It also records the amount of material that is passed through it and thus furnishes a convenient and reliable means of determining just what amount of material has changed hands. A Richardson automatic scale is also provided to

keep track of the amount of gypsum supplied to the board plant of the Empire Gypsum Co., which also adjoins the mixing plant.

The board plant of the Empire Gypsum Company in which is manufactured a considerable quantity of wall board, is a model of order and cleanliness. Construction work on this board plant is not quite complete, although operations are carried on without the additional equipment that is being put in at the present time. This new machinery will add a number of refinements to the methods of making wall board.

The plant of the Empire Gypsum Company is electrically operated throughout, the only place where coal is used being in the kettles. General Electric motors and controllers are used pretty generally, throughout and square D safety switches are installed in all places where the operation of an open switch would be in any way hazardous.

In connection with the plant is a machine shop for handling a large part of the repairs that continuous operation makes necessary. Here also the rock drills are kept sharpened. This in itself involves no small amount of work, for efficient work by the drill runners requires, among other things, that the equipment that is used be always in good condition.

The main office of the Empire Gypsum Company, Inc., is in Rochester, N. Y. Here Mr. Augustus A. Wolf, president of the company, maintains his offices, as does also Mr. Theodore W. Curtis, sales manager. The plant at Garbutt is in charge of a superintendent, Mr. C. M. Diffenderfer, assisted by Mr. Frank Shaefer. The company has high standing in the gypsum district of Western New York, and supplies local markets with a large amount of finished gypsum products.



## Is Your Dredging Modern?

**I**N NEARLY all of our larger rivers, near their mouths, and in our harbors and bays and likewise in many inland lakes, deposits of sand and gravel can be found. As these sources of supply are in most cases near our larger towns and cities, or else cheap water transportation is available when the distance is great, a tremendous industry has been developed in reclaiming these building materials from our bodies of water and selling them in the cities.

Many of the dredging plants are not only costly, but well designed, and although there is bound to be a fairly heavy plant charge against the production, yet the cost of reclaiming the sand and gravel is small due to the cheapness of operation of these well designed plants. The fact is, that the dredging and production of gravel from streams has been so cheapened that in many localities the low price of gravel has made it difficult for other materials to compete.

Although there are many well designed dredging plants used to produce sand and gravel, yet it is quite surprising how many makeshift dredges or dredging plants are found in use. In most of such cases this not only means a curtailment of the production, but the cost is considerably increased.

In some cases such plants are continued in use due to lack of ready capital to replace them with modern economically operating machines, while in other cases it is due to a lack of knowledge on the part of the operator of modern pumps, dredges and excavating machines that are on the market.

It is a case of believing the plant that is being used is modern and of being satisfied. Thousands of dollars are lost yearly due to business men being satisfied with their profits.

In a business it should not be, "Is a profit being made," but rather, "*Is all the profit possible being made?*"

That should be the standard by which to judge a business. Satisfaction is better than dissatisfaction: but satisfaction has lost many an opportunity of making a fortune, and in some cases has caused a man to drop so far behind his competitors that he has been engulfed in the stream of failure, never realizing that his satisfaction has brought continued disaster until it was too late.

Today there is no need of a man lacking knowledge as to his business. There are too many trade papers that bring to the business man information and warning. Manufacturers give information through advertisements and catalogues. Expert services can be obtained for reasonable fees, so that no one need be dependent upon his own knowledge.

The basis of all dredging is either in pumps or excavating buckets and many manufacturers not only furnish information on such subjects in printing or writing, but likewise furnish engineering advice without cost to their customers and possible clients. Thus every operator can post himself to some extent as to whether or not he has a modern plant and one designed especially for the work he has to do.

Knowing such facts the operator is in a position to make such improvements, or to so rebuild his plant as not only to produce his products cheaper than his competitors, but to make all the profit possible; and that is why he is in business.

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The Pensacola Gravel Company, Pensacola, Florida, has been incorporated with a capital of \$3,000. Officers and directors: J. Y. Baillies, president; A. V. Freema, vice-president; R. Leon Jones, secretary and treasurer.

## The Use of Big Blast Hole Drills

HERE is a large quarry having a modern crushing plant with a rated capacity of several thousand tons of crushed stone per day; and yet all the drills at work on the ledge are of the hammer type, some large and powerful enough to drill holes from 10 to 15 feet in depth. The high ledge is taken down in benches without any great regularity as to the location of the bench and the drill holes. Thus ladders must be used and men must climb over the face of the ledge carrying drills and explosives, a dangerous task for any one.

A second quarry, with a face to the ledge of about 100 feet, does all the drilling with tripod drills. Here again the task is similar to the quarry using the hammer drills with the same attending danger.

A third large quarry does most of its blasting by means of tunnels or gopher holes driven into the face of the ledge at the quarry floor.

In the writer's opinion each of these operators is making a serious mistake and one that is likely to add considerably to the cost of blasting by using one method exclusively in doing their drilling.

Hammer drills should be used in every quarry, for they are needed for many purposes and a quarry that does not possess among its equipment some of these drills, can hardly be classed as up to the times.

The same thing might be said of the tripod drills, as there are a number of uses for this type of drill in every quarry.

Gopher holes for blasting can likewise be recommended, but at times they are too expensive for the depth of the ledge and the tonnage they will throw down.

For great height of ledge and for heavy blasting the most economical

method of drilling holes for large blasts is by means of big blast hole drills, formerly known as well drills. A comparison of the method of operation and the results obtained by these drills should give a lesson to all who are not using them.

A few words as to the history of these drills might be of interest and also show their adaptability.

Deep blasting was formerly done entirely by means of long churn drills by hand. The writer has driven holes by this method more than 70 feet deep. The alternative was to take the same depth in benches. Both were expensive and also slow. But the writer found it cheaper for a great depth when rock was to be moved with a steam shovel to drive the deep holes instead of benching the ledge.

The credit is given to a prominent contractor as being the premier in the use of a well driller for driving a deep blast hole. As the writer has the story, such a machine was first used for this purpose on this contractor's work, but against his will and desire, and he discharged the foreman for hiring a drill for this purpose until he learned that the machine had saved him considerable money, when he put the foreman back to work and bought a machine, following it with the purchase of many others. This incident called the attention of many people interested in deep rock drilling for blasting, to this method. The manufacturers of such machines soon found that the ordinary well drill had to be built stronger and adapted to this particular kind of work.

Within a few years of the incident related many contractors were using these drills, and this was followed by quarry-men and deep open mine operators adopting them.

At first the knowledge of their economic operation was meager and it was necessary to try them out for differing conditions.



One of the early ideas was that these machines were only practical and economical for very high breasts in quarries, while it has since been learned that the drills can be used down to such depth as has proven the limit of the largest sizes of tripod drills.

Much too has been learned as to the diameter of the holes drilled and regarding the spacing and loading. By them the drilling per cubic yard of rock blasted has been much reduced in cost, and in some cases a saving has been effected in the amount of explosive used, but it is not always possible to save explosives. Generally speaking a big blast hole drill will save enough in the blasting operations to pay at least 100 per cent annually on the money invested, while in many cases this will be materially increased.

For any fair depth of holes when benching rock and drilling with small drills, the holes are made of smaller diameter the deeper they go, hence excessive springing must be done to get a fair amount of explosive in the hole. On the other hand the big blast hole drill makes a large diameter hole the same size from top to bottom. With the wide diameter regular width of hole a greater amount of explosive can be placed not only at the bottom of the hole but also at any depth desired in the hole.

It is these facts that allow, when using a large machine, of greater spacing of holes. This alone would reduce the cost of drilling per cubic yard of rock blasted. Based upon the cubical contents of the two holes the larger hole will be found much cheaper to drill.

The cost of explosives for the large holes will be less than for the small hole, due to the fact that the yardage from each hole is much larger and also that the full force of the explosive may be expended on the rock

These things mean that the stone is

brought down in better condition, which saves secondary blasting. With the small diameter hole much of the stone is likely to be thrown down in large sized boulders, so that the majority of the pieces of rock are even too large to be handled by a steam shovel. For hand and power loading this means much sledging must be done and a large amount of blast hole and adobe blasting made necessary.

In large quarries where fair sized shovels are used for picking up the rock and large primary crushers for breaking, extremely large blasts have been made, where the drilling was done with big blast hole drills, when less than 5 per cent had to be broken.

Besides this feature, the big blast hole method entirely eliminates the benching of the ledge and also to an experienced blaster affords the opportunity of so handling his explosives as to throw down his rock over a large area for picking it up by hand, or keeping it in a pile so as to readily pick up the rock with a power shovel.

Another advantage is that the drilling can be done ahead of time and the shots are so large that there can always be ample stone kept loosened so that the crushers can be operated to the maximum capacity.

There is still another feature that makes the big blast hole desirable and that is the fact that by this method fewer blasts are put off and thus there is less lost time than when a large number of lighter blasts are put off continually, followed by a large number of secondary blasts to break up boulders, several times a day.

The use of small tunnels, if properly laid out, can be recommended for extremely high breasts of rock, especially those over 100 feet in height, but even then holes should be drilled down from the top by the large machines in order to lighten the load on top of the tunnels and break up the rock so it can be handled.

# Electrical Hazards in Cement Plants

A Paper Given Before the National Safety Congress

By MAJOR HENRY A. REININGER

Lehigh Portland Cement Co., Allentown, Pa.

A GREAT majority of cement plants are in far better condition today than they were previous to 1915. Much of the equipment furnished by the various electrical companies is now provided with safety devices which eliminate many of the accidents which occurred some years ago. Most of the electrical apparatus is operated at less than 550 volts, however, a great many of the plants are using high voltage from the central stations and transforming it to their required voltage. In general, the higher the voltage the greater the protection necessary. I am afraid too little attention is paid to the power-voltage currents, leaving many of the 110-volts contact points here. Serious and even fatal accidents are recorded from 110 and 220 volts. One hundred and twenty and 220 volts hitting a man when he is overheated and wet with perspiration, or where the floors are wet or damp, have proved fatal to men with weak hearts. Too much care cannot be paid to the placing of men on electrical work; they should be in good physical condition.

In cement plants, where we have the hazards of dust and dampness always with us, it is very advisable to place electrical machines, transformers, etc., in separate rooms and enclose them entirely and ample space should be allowed around these machines so that all conductors are easily accessible. All railings, platforms or any guard of metal construction should be permanently grounded when near electrical apparatus. Where apparatus has been placed in a separate room, the doors should be kept

locked and every precaution taken to keep men unfamiliar with this work away from the machinery.

The question of repairing electrical apparatus and wires is one which causes considerable trouble. All wires or machines, of whatever voltage, should be "killed," if possible, and under no circumstances should any repairs be made on live equipment carrying 2,300 volts or higher. The best instruction to give all men repairing electrical work should be that all wires are alive. Any switches which are thrown out for repair work should either be locked or tagged and no one should touch them except the foreman of the repair gang. The rubber shields for men working on poles or around wires should be used at all times, and all tools, such as screwdrivers, wrenches, pliers, etc., should be insulated before being used.

**Hand Lamps.**—When using hand lamps men frequently work in close places, often overheated, their bodies are moist by perspiration or dampness, and offer very little resistance to the flow of electricity. Fatal accidents have occurred from 110 volts under these conditions. All portable lamps should have armor cable with a fibre guard and handle.

For linemen the combination tool and safety belt should be used at all times. Rubber gloves are also a protection. Good shoes, waterproof if possible, with rubber soles and heels are always a great protection to men working around electrical apparatus.

In regard to lighting around the plants, electrical codes of the various states take care of this problem. The disconnecting arc lights are probably



the best to be used around cement plants, for they are easily accessible for cleaning.

In regard to generators all of the moving and live parts should be guarded against accidental contact. This can easily be done by enclosing the rotary and exposed parts of the shaft by wire guards.

**Grounds.**—The current-carrying capacity of ground wires should be big enough to trip breakers, instead of burning at the grounds. No switches should be placed on ground lines. All metalwork in the vicinity of alternating ground circuits and conductors should be permanently and effectively grounded. All grounding connections should be as short and direct as possible and should be tested frequently to know that they are in working condition.

**Switchboards.** — All switchboards should have rubber matting in front of them and ample space so that a man can move back and forth without coming near the board. In the rear of the switchboards ample space should be allowed for a man to walk about without getting near any of the wires. The rear should be enclosed to keep out all except those men who are needed to work on the board. Exit should be provided at both ends, gates to open outward. Insulating covering, such as rubber matting, should be provided on the floors in the rear of switchboards. This covering may be laid on any good floor where the switchboard voltage is 2,300. Where the voltage is higher, insulated platforms should be used first and then covering. Cork carpet, linoleum and rubber matting have proven satisfactory insulating covering.

**Fuses.**—Open fuses should not be used. Another bad practice found in cement plants is the use of ordinary wire or nails in place of fuses between the terminals. The various new types of safety switches and fuse boxes have

eliminated a great many electrical accidents; these boxes are so arranged that when they are open the switches are cut out and fuses can be replaced without danger. The question of switches, fuses, wiring, etc., is very well taken care of in the requirements of the National Electrical Code and the various lighting codes of the states.

**Transformers.**—Transformers should be placed in a separate room and kept locked; however, we find a great many transformers set out in the open. In this case all transformers should be protected with a high fence which will keep out all persons. Signs should be placed on the fences cautioning persons against the danger of electricity and warning them to stay away from the transformers.

With all the protecting devices which are now being placed throughout industrial plants we believe that education is far more necessary than guards, and we wish to impress upon all company officials that education of the foremen and the men should not be neglected. Signs should be used where possible and general talks on the hazards of electricity should be given to the men by officers of the electrical department or others thoroughly familiar with the subject.

All repairs should be made by the chief electrician or one of his men, and no employee allowed to make repairs around electrical machinery unless he is a member of this force.

One other thing of vital importance is the training of men in first-aid work. The electricians and foremen should be thoroughly familiar with the Schaefer method of resuscitation. Even though the plant is equipped with lungmotor or pulmotor, very often valuable time is lost in getting this apparatus to the scene of the accident and men should be instructed how to remove men coming in contact with live wires.

## Unified Road System

### Progress Being Made Toward This Goal—Other Capital Matters

By Our Washington Correspondent

Road officials all over the country are outlining programs of road building that will eventually link up state systems, according to the Bureau of Public Roads. A recent meeting of the New England State highway officials and engineers marks an important point in the development of highways in this country, says the bureau. This, it says, is the first meeting ever held between officials empowered to act, for the purpose of laying out a system of highways to serve an area larger than a single state. It is the first of a series of similar meetings which will be held between the Federal officials and highway authorities of various groups of states, the object of which will be the solution of the problem for the whole country. This progressive step, long wished for by all users of the highways, can be attributed to the requirements of Federal-aid legislation. It is required that all Federal aid be spent on a connected system of highways designed to serve the needs of the whole country. Tentative systems have been submitted by all except eight states, and now the series of meetings is being held to connect and co-ordinate the proposed state systems. The bureau intends to push this work as rapidly as possible, so as to lay before the people the plans for what will be by far the greatest highway system in the world. At present only roads certain to be on the system are being approved for construction with Federal aid. It is estimated that the system will comprise 180,000 miles of highway.

In connection with this final goal of 180,000 miles of Federal-aid roads it is estimated that about 20,000 miles already have been constructed and that about 15,000 miles are under construction. Including projects not yet under construction, Federal-aid roads in all stages now total 40,338 miles. There is no indication of any slackening of the greatly increased rate of progress which began with the season of 1921 as the states continue

to pour in plans for new projects and place them under construction as rapidly as possible. Nearly twelve and one-half million dollars was obligated to new projects in June and July, alone. At the present time the force of the bureau is taxed to the limit with the examination of new plans and projects, inspection of roads under construction and the planning of the Federal-aid highway system which is being gotten into final shape.

But even with these plans pouring in the bureau finds time to give intensive study to the requirements of road building along almost every line. Just recently it perfected a device that tells what happens under a roadway as traffic passes over it. The device is one of the new instruments developed by the bureau in its efforts to discover what thickness of roadbed should be constructed for heavy or light traffic on various kinds of soil. Primarily the device measures, at desired distances, how the burden of traffic is distributed through the roadbed to the soil on which it rests. A thick roadbed lightens the load on every square foot of underlying earth or rock; a thin one places thereon more weight. How far distant from the surface point of contact—where load meets road—the weight is distributed and the possible formula for its distribution are being determined by experiment. When the facts are fully known and the traffic burden on the nearby and underlying soil is accurately measured, road makers will have a valuable guide as to the thickness of the roads they should construct on varying kinds of subsurface. A semifloating metal drum, an indicator, compressed air, slabs of roadbed made of different materials and thickness, and a measured load go into the making of the experiment, which will be conducted at the department's experimental farm at Arlington, Virginia.

And in this connection the bureau has perfected an instrument for testing soils on which roads are to be built. It consists of a metal disk resting on the soil and supporting a cylinder into which shot can be poured. The apparatus is held in position vertically by means of a tripod, at the top of which is mounted a small dial that tells to one-thousandth of an inch how far the disk sinks into the soil as shot is poured into the cylinder. By means of the instrument



It is possible to get information as to how the soil will act in wet weather. The kind of soil beneath a road surface has a great deal to do with how it will stand up under modern traffic, and engineers look upon this as an important consideration in determining the kind of road to be built. This is confirmed by a number of instances where two sections of the same road have been built in exactly the same manner and subjected to the same traffic but on different types of soil. One section has lasted well while the other has broken up in a manner that can only be explained by a lack of supporting power of the soil beneath the road. The bureau has for some time been investigating this question along various lines both in the field and in the laboratory, studying the characteristics of different soils and experimenting with means to keep down the moisture content of the soil and thus increase its bearing power. The latest development has been the new device.

What causes a "tarred" road to develop that peculiar scrubbing-board surface is a question that has been worrying the highway engineers quite as much as the long-suffering public. As often as not the symptoms appear in a macadam road that has been treated with asphalt. But the trouble is largely confined to roads built with tar or asphalt. Concrete and brick roads never develop such a surface, and ordinary dirt roads seldom do. The bureau is building at the Arlington, Va., experimental farm an experimental roadway 15 feet wide in an effort to discover the cause of the trouble. The road is laid out in the form of a circle with a 90-foot radius, and its circumference, 565 feet in length, is to be divided into sections, each of which will be surfaced with a different kind of asphalt or tarred surface. The experimental sections will be built exactly like actual road surfaces and when completed they will carry a "traffic" as much like actual traffic as it is possible to devise. The "traffic" will be supplied by a driverless motor truck which will be held to the circular path by means of a long arm extending from the center. The course of the truck will be altered from time to time so that the entire width of the roadway will be traveled. It has not been possible to determine the cause of observation of actual roads because there are too many un-

known quantities. The defect may be due to distortion of the earth under the road surface or to defects in the surface itself. It is probably caused in some way by the wheels of motor vehicles—how and why the engineers have not determined, largely because they have never possessed all the facts with regard to surface and sub-surface conditions and character and weight of traffic.

And here is one that will directly benefit the contractor and probably avoid a lot of controversy. It has to do with how smooth should a contractor reasonably be expected to make the surface of a road. Engineers of the bureau have devised an instrument for settling this question. When passed over the road it indicates the slightest unevenness or roughness. The instrument will be used to test the surface on different types of roads of good workmanship, thus determining a standard which contractors can be held to. Smoothness in a road is, of course, desirable for the comfort of travelers, but it is also desirable for other equally important reasons, say officials of the bureau. The vertical movement of a motor vehicle caused by roughness wears the machine and requires more power of the engine. In connection with experiments along this line another instrument has been devised. Attached to a vehicle this determines the amount of jolting or vertical movement caused by different degrees of roughness or unevenness in the surfacing.

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The contract for the construction of the state-owned cement plant, to be located at Rapid City, S. D., has been awarded to J. C. Buckbee & Company, Chicago engineers. The plant will cost \$1,300,000 and work will be started as soon as conditions permit.

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The Ohio River Gravel Co., of Parkersburg, W. Va., recently obtained an injunction against C. D. Dotson, C. H. Wright and the Kanawha Sand Co., to restrain them from operating in the sand and gravel business in the vicinity of Parkersburg. The Ohio River Gravel Company maintains that at the time they bought these people out they obligated themselves not to engage again in the same line of business, and that they have recently opened up a competitive business.

## Charged with Forgery

### Other News of the Pit and Quarry Industries in Indiana

By Our Indianapolis Correspondent

Leonard Hodgen, of Kokomo, Ind., president of the Kokomo Stone Company, was arrested recently and taken to Marion, Ind., after the circuit grand jury there had returned four indictments against him. His bond was fixed at \$8,000 and immediately provided. He is charged with forgery and with filing false claims. All charges in the indictments relate to the delivery and alleged delivery of stone by his company to Grant county for improvement of the highways. The indictment for filing false claims relates to a claim for \$19,024.40 for the delivery of 11,094 tons of crushed stone last year when it is alleged only approximately 10,387.75 tons of stone were delivered and for another alleged false claim for the delivery of 6,010 tons. The indictments for forgery allege that he forged a waybill on carloads of crushed stone, which it is claimed contained 155 tons, but which was alleged to have been forged for 175 tons, and further that he filed a claim for \$19,024.40 for stone which is alleged he knew was wrong.

The cement, stone and gravel producers and distributors in Indiana are watching closely the experimental and research work by the engineering department of Purdue University in co-operation with the United States bureau of public roads to determine the effects of different kinds of tires on roads; the effect of various sized loads and the different types of concrete construction. Two federal engineers will be assigned to Purdue shortly to make these tests with the university engineers. In the tire tests, the effect of the new solid tires with the old ones will be compared and the effect of solid will be compared to pneumatic tires. Different pressures in pneumatic tires will be studied and the recovery of strength after a pneumatic tire has passed over, will be determined. The research workers also will find the area of contact of a pneumatic tire with a slab when the tire is inflated at different pressures.

Next, the work will determine the critical load which may cause a failure

in a concrete beam by fatigue and also ascertain the effect of conditions which may affect the critical load, to what extent fatiguing is accomplished by heat and the effect of variation in the richness of the mixture. These lines are a continuation of the work already under way at Purdue. However, another line of work is to be undertaken which includes road tests of concrete slabs to study strength and distribution of stress in different designed concrete road slabs. While the University is taking up these studies for the special benefit of Indiana roads, the results will be available to the United States bureau for the entire country. Purdue is the only institution where such work is being done.

More than a thousand taxpayers in Central Indiana met recently in Noblesville, Ind., and formed a permanent organization for the purpose of reducing taxes by a suspension of all road improvements for a period of three years. Some of the speakers declared that half the money paid in taxes either was spent for the construction of new roads or the repair of old. There was a strong sentiment at the meeting for the repeal of the three mile gravel road law in Indiana and also for a modification of the automobile license law so that the money from this source can be distributed among the various counties of the state rather than go to the support of the Indiana Highway Commission.

The Indiana Quarries Company at Bedford, Ind., has awarded the contract for the construction of a stone mill to replace the mill lost some time ago by fire. The new mill, with machinery will cost approximately \$400,000. Work is to be begun at once. The building will be of brick, stone, reinforced concrete and steel and will be fireproof.

Four Martinsville, Ind., men and four Indianapolis men have filed articles of incorporation for a company, capitalized at \$1,000,000 for the purpose of promoting a stone quarry in the heart of the Oolitic limestone belt, near Ellettsville, Ind. The land to be quarried has been thoroughly cored and every core shows it to be of the finest buff Oolitic limestone. There are 194 acres in the trade and already one quarry has been opened. The quarries will be electrically equipped and will be among the largest in Indiana. There have been eight sites picked for quarries. The



# AMERICAN LIMESTONE COMPANY

## "MASCOT"

### PULVERIZED LIMESTONE



KNOXVILLE, TENN

Sept. 12, 1922.

OUR BANKERS SHAPE THE POLICY  
OF OUR AGRICULTURE.

ALL CONTRACTS AND AGREEMENTS ARE CONTINGENT UPON STRIKES, ACCIDENTS, DELAY IN MILL DELIVERIES, AND OTHER OCCURRENCES BEYOND OUR CONTROL

Mr. Wm. C. Beacham, President of the Peoples National Bank, Greenville, S. C., in a letter sent to the farmers of Greenville and surrounding Counties urging that on account of general invasion of boll weevil, more attention be given to soil building and the necessity of growing on the farm all the food and feed necessary, concludes his letter with the following paragraph:-

"LIMESTONE is highly recommended for use in connection with grain and hay crops, increasing the yield and materially improving the land for all crops. Our farmers should at least experiment to some extent with Limestone in order to learn its value, and we have decided, therefore, to furnish it to those who wish to do so at cost".

This Bank made arrangements with a local Fertilizer Company to store and handle Limestone for the farmers at cost of handling.

This Bank knew that its farmer patrons should be able to get Limestone as they needed it and when most convenient for them to haul, and in order to encourage their farmers into the habit of using lime, furnished this service.

Stocks of Limestone should be carried at every loading station.

Very truly yours,

FS/B

Sales Manager.

"MASCOT IS THE STANDARD AGRICULTURAL LIMESTONE"

This kind of circularizing helps sell limestone.

Directors and sole owners of the corporation are James R. Gum, Eugene J. Shireman, Everett Lowder and James Wampler, of Martinsville, and Roy McNair, Clark E. Mallery and Fletcher and Walter Johnson, all of

Indianapolis. The men bought the land four years ago with the expectation of opening a quarry, but only recently was the company incorporated. They also hold an option on thirty-five adjacent acres.

## Stone Convention Date

During the Convention of the National Crushed Stone Association, which will be held in Chicago, January 15, 16 and 17, more attention will be devoted to operating practice than in conventions of the Association held in former years. It is the intention, so far, to go over everything about the operation of the quarry and crushing plant, from the stripping of the overburden to the loading of railroad cars with the finished product.

Some items of the program have already been tentatively arranged for and it appears that, when the Association meets in January, its time will be laid out very profitably over the three-day session. Even if the program does nothing more than give the Convention a flying start along the right lines, it will still be of considerable value. Much of the best material that the Convention will bring out will, of course, come spontaneously and without prearrangement from the membership.

During the same week that the Crushed Stone Convention will be held in Chicago, the American Road Congress will also be running in Chicago and this affords another substantial reason for the choice of time and place. It is quite unlikely that anything will change the intention of the Stone Association Directors to hold it at the time and place specified above, but official announcement has not as yet been made.

## Special Convention

A constitutional convention, for the purpose of adopting a new constitution and by-laws for the National Association of Sand and Gravel Producers, will be held in Chicago on November 15, at 10:00 o'clock, at the La Salle Hotel.

A Ruggles-Coles Class F-O dryer has been recently sold by the Ruggles-Coles Engineering Company, 120 Broadway, New York City, to the Silica Products Company, Lowville, New York, for drying their sand. A Ruggles-Coles Class B-2 dryer has also been sold by this company to the Brown Corporation, La Toque, Quebec, Canada, to be used for drying their lime sludge.

## New Drag Scraper

A new type of portable power drag scraper equipment especially suitable for use in small sand and gravel pits for cut and fill work on highway construction, or for storing and reclaiming loose materials, has been brought out by Sauerman Bros., 312 S. Dearborn St., Chicago.

The new outfits are equipped with "Crescent" type power scrapers, which are especially suited for use with a light power unit as they are easy to pull and travel straight. The double drum hoist is furnished with gasoline engine direct connected, or is arranged for belt drive from tractor or other motive power. The truck frame is of heavy steel channel construction mounted on broad tread, grooved steel wheels with steel axles.

Any laborer on the job can operate a Sauerman portable scraper outfit. One man handles the entire operation through two levers placed side by side. There is nothing for another man to do, for the scraper just has to be dragged back and forth, loading and dumping being accomplished automatically at the will of the operator. The front drum of the hoist operates the "load" cable which leads through a sheave from the drum to the bridle chains on the front of the scraper. The "pull-back" cable leads from the rear drum through another sheave out to a guide block at the far end of the excavation, and then is attached to the rear bridle chains of the scraper.

The entire outfit can be made ready to move in a jiffy and in less than an hour after arriving at new location it can be in operation. In moving from one set-up to another, simply wind the cables on the drums, disconnect the bridle cable, put the scraper and blocks on the truck, hook on the tractor, motor truck or team, and pull out. At new location sink the wheels of the power unit into the ground, connect bridle cable to new stakes or deadmen, locate guide blocks, haul out the cables, hook onto scraper bucket turn over the engine and go.

These little outfits are modest in price, yet embody the same quality features of design and construction that are found in the large Sauerman power scraper and dragline cableway excavator equipment.





Airplane view of Star Sand Company's operations at Coffin Rock, near Long-Bell valley property, four miles west of the mill site. It is 200 feet high, and is reputed to be an old Indian burial ground. The sides are very steep. The rock is covered with trees and is a beauty spot.

### Viewed By Airplane

The above photograph of the plant and operations of the Star Sand Co., at Coffin Rock, near Kelso, Washington, has two unusual features about it. One is that it was taken from an airplane, and the other is that it is shown in a house organ of a prominent sawmill and lumber concern. The Long-Bell Lumber Co., which is now creating a great milling plant near Kelso on the Columbia River in Washington where the company owns 70,000 acres of fine timber. In a bulletin describing the progress of these operations there are a number of airplane views, one of which shows the operations of the Star Sand Co., at Coffin Creek, near the Long-Bell Valley property four miles west of the mill site. The so-called Coffin Rock is said to be 200 feet high and is reputed to be an old Indian burial ground. The sides are very steep and the rock is covered with trees and is a beauty spot. The crusher plant stands next to the river.

The Wheeler Lime Co., Nashville, Tenn. with a capital of \$200,000 has recently filed articles of incorporation. The incorporators are: F. H. Wheeler, H. A. Williams, King Sparks, W. Bush Sneed and Wm. Hume.

### Bucket Loader for Stripping

Barber-Greene self-feeding bucket loaders are being used for stripping a gravel deposit in De Kalb county, Illinois.

On the best day one man and a machine loaded 104 trucks in 10 hours. Each truck has a capacity of 2 cubic yards, but in this case, the trucks were loaded high and were well trimmed. Figuring the minimum load at 2 yards, the total amounts to 208 cubic yards. Figuring that each truck carried  $2\frac{1}{4}$  cubic yards, which is nearer right, the 104 loads amount to 234 cubic yards.

Had the ground been pulverized as well as plowed, it would have been possible to have loaded much more. Notice the many large hard lumps. Plowing is none too good at times, as a truck is used to pull the plow when horses are not available. However, in spite of the conditions of the ground, only one man was used to operate the loader and the feeding discs were not aided by any shovellers.

Costs (without depreciation figured) are given below for the best day:

|   |              |
|---|--------------|
| 10 gals. of gasoline for loader at \$2.12 per gallon..... | \$2.12       |
| 2 quarts of oil for loader at \$0.25 per quart .....      | .50          |
| 1 operator for loader at \$0.45 per hour .....            | 4.50         |
|   | <hr/> \$7.12 |

Cost =  $\$7.12 \div 234 = 3$  cents per cubic yard.

## Fair Activity Continues

### Prices in the East Remain Firm Despite Seasonal Decline in Demand

By Our Eastern Correspondent

There is an optimistic tone in the sand, gravel and crushed stone markets at New York and vicinity, despite the fact that business is a little more limited than that prevailing a few weeks ago. Producers continue to maintain fair activities under favorable weather conditions, with building supply dealers seeking more business in practically all commodities. The seasonal lag in construction operations, not unexpected, may be held as largely responsible for the drop in trade, but the new work in sight gives well justified encouragement in the situation.

Prices show no tendency to follow the downward trend of sales, for they are holding firmly at now well-established levels, and as in the case of cement, advancing to higher figures in a number of instances. This is bringing a little reaction, for important construction projects await more general stability than found in a fluctuating market. Sand, gravel and kindred products feel the effects of this condition and necessarily are dependent upon other basic commodities for volume sales.

Stone quarries, sand and gravel producers and affiliated lines are making the most of the seasonable weather, and with distribution lowered, the opportunity to stock up for the winter months is being given full play. As a consequence, there is every assurance that early spring supply will be more than equal to the demand. Building supply yards are curtailing orders to a point of current reasonable call, and the majority of yards in this section are quite well stocked.

First grade, washed sand is quoted at a \$1.00 a cubic yard level in cargo lots. A year ago this time, the material was selling for \$1.25 in the wholesale market. Building material dealers continue to ask \$2.00 a cubic yard, delivered on the job. Fine white sand holds at \$4.50 a cubic yard, delivered.

The best gravel is obtainable at \$1.75 a cubic yard in carload lots, wholesale,

at New York, both 1½ and ¾-inch sizes. This is about 25 cents below the price in October a year ago. Supply yards continue to quote \$2.75 for the material delivered at the job site; long hauls carry a proportionate increase. Grit is being retailed at the same figure.

There is no change in the levels for broken stone; 1½-inch material is selling for \$1.65 a cubic yard, carload shipments, wholesale, and ¾-inch at \$1.75. Likewise, the same price of \$4.00 at the supply yards for delivery on the job, quoted in the last issue of PIT AND QUARRY, continues to prevail, and this figure is now quite generally recognized as the standard trade quotation.

Advancing mill bases in the line of Portland cement has lead to another increase in the retail market at New York, and dealers are now asking \$3.25 a barrel, as compared with \$3.20 a month ago. The customary bag rebate of 10 cents holds. The wholesale situation shows even a more marked advance, for from \$2.60, the figure of a month ago, a rate of \$2.75 is growing in popularity, with a few sales still recorded at \$2.65 and \$2.70. For f. o. b. alongside dock material to dealers, the price is now \$2.55 a barrel. A month ago, this latter figure was \$2.30, while a year ago it was around \$2.10.

Barreled common lime is quoted at \$2.80 to \$3.15 at the warehouse, while barreled finishing stock is around \$3.64. Hydrated finishing lime, wholesale, is priced at \$16.90 to \$16.18 per ton, while common hydrate stock holds at \$13.10 a ton. Finishing lime, delivered from the dealers' yards, 300-pound barrel, is selling for \$4.50 a barrel; common lime, same size container, is priced at \$3.75 a barrel, delivered. Hydrate finishing lime, paper bags, is selling for \$24.00 a ton, while hydrate common, paper containers, is quoted at \$19.50. Neat cement wall plaster, in cloth bags, is available at \$21.00 a ton, delivered on the job. An early advance in lime and plaster prices is anticipated.

The Crystal Sand & Gravel Co., Boston, Mass., has been formed under state laws with a capital of 1,000 shares of stock, no par value, to operate a local plant. John W. Pearson, 132 Church Street, Newton, Mass., is president and treasurer.

The Presbrey-Leland Granite Co., Barber Building, Brattleboro, Vt., has awarded a building contract to the



Palmer Corporation, Holyoke, Mass., for its proposed new plant on local site, to consist of a main one-story granite-working plant, 135x265 ft., to be equipped for cutting, polishing, grinding, etc.; one-story machine shop, 60x90 ft.; and office building adjoining, 30x50 ft. The new plant will cost about \$150,000, including machinery. W. S. Martin, head of the company, is in charge.

The Boston Sand & Gravel Co., Boston, Mass., is maintaining active operations at its properties, with local distribution of sizable account. Throughout the present year, business has been increasing in volume, with August, the last month for which a statement has been issued, showing a net income of \$25,131, or a gross business of \$65,750. For the twelve months ending August 31, the company reports a net balance of \$167,497, as compared with \$141,233 for the previous year. The gross business for the last year, 1921-22, was \$560,842. The balance sheet of the company shows total resources of \$2,659,891.

Effective October 1, the Vermont Marble Co., Proctor, Vt., has made a general advance of 10 per cent in the wage scale at its quarries and plant, affecting about 3,000 employees.

The Hallowell Granite Works, Granite Hill, Hallowell, Me., is rebuilding the portion of its machine shop, recently destroyed by fire, with loss of about \$15,000.

The Genesee Sand & Gravel Corporation, Buffalo, N. Y., has been organized under state laws with a capital of \$100,000, to operate local sand and gravel properties. It is headed by H. L. Perney and J. E. Jeplowitz; and is represented by B. D. Reisman, attorney, Buffalo.

The Trenton Lime Co., Remsen, N. Y., has filed notice of increase in capital from \$40,000 to \$625,000, for proposed expansion.

The Syracuse Sand Co., Syracuse, N. Y., has arranged for a stock issue of 2,000 shares of stock, no par value, the proceeds to be used for proposed general expansion.

A decision is soon expected from the Court of Appeals, Albany, N. Y., with respect to the constitutionality of the Donnelly anti-trust act, under which the Buffalo Gravel Corporation, Buffalo, and other companies in the same line of industry in this section, have been indicted. The action is the result of

the recent Lockwood legislative committee investigation.

The Pittsburgh Limestone Co., Altoona, Pa., has resumed operations at its local quarries in this district, following a curtailment for nearly two years. Extensive operations are projected. The output of the property is used for the most part at the Braddock Works of the United States Steel Corporation. The Pittsburgh Limestone Co., maintains headquarters at New Castle, Pa.

The Pennsylvania State Industrial Board has handed down an important ruling holding that a minor between sixteen and eighteen years of age may serve as an apprentice in stone cutting, but not at a quarry. A general investigation of apprentices in the industry has been ordered.

The Falls Creek Sand & Stone Co., Clearfield, Pa., is running under heavy output at its plant, giving employment to a normal working force. Heavy blasting work is being conducted; a recent charge, late in September, required 16,000 pounds of dynamite to fill 75 holes for loosening about 20,000 tons of sand. Arrangements are being perfected for another charge of about 25,000 pounds of dynamite at an early date.

There is a noticeable scarcity of railroad cars for sand and gravel transportation in Pennsylvania at the present time, and producers are doing their best to overcome the situation. An appeal has been made for sufficient cars to supply current demand. The shortage is resulting in the accumulation of stocks at a number of plants, covering material which has been on order for some time past.

Thomas S. Donnon, Slatington, Pa., a prominent slate producer of this section, died, September 20, at his local residence at the age of 78 years. He was one of the early operators in the slate industry here, commencing in 1863. At one time, he conducted the Lehigh Slate Co., and later carried on a quarry at Slatedale, Pa.

The Coopersburg Improvement Co., Cooperburg, Pa., is at the head of a project to establish a local granite polishing plant. A site has been selected.

The Edison Portland Cement Co., of Orange, N. J., recently announced a wage increase of five cents per hour for the mill employees, effective on September 15th.

## Priority and Car Supply

### Together With Other Matters of Interest From the National Capital

By Our Washington Correspondent

Meagre reports to the headquarters here of the National Sand and Gravel Association fail to show conclusively what effect the recent Interstate Commerce Commission order No. 25 has had on the industry, but as far as T. R. Barrows, recently appointed executive secretary to succeed E. Guy Sutton, is able to conclude a large number of producers have derived relief from the provisions of the order while there are still some who have not yet felt its benefits. On the whole, however, it is the belief of Mr. Barrows that the industry generally has been benefited.

Secretary Barrows is urging members of the association who are being cut off or greatly restricted in their supply of cars to immediately report their cases to the association and they will be handled individually before the commission. Through Mr. Barrows, the association is now negotiating with the commission and with the railroads direct in several individual cases and it is the belief of officers of the association that much good can be accomplished by bringing these cases individually to the attention of the commission in order that the commission may be constantly reminded of the excellent effects some of the priority orders have had. The association takes the stand that the principle of priority is in itself wrong and efforts have been made and are now being made before the commission to have this principle set aside.

It has been ascertained by the Washington headquarters that, for the present at least, there will be no limitations placed upon the free use of the reconsignment privilege by the commission during the existence of priority orders. Commissioner Aitchison recently communicated with Federal Fuel Distributor Spens on the question of reconsignment privileges, and Mr. Spens replied that he did not believe the reconsignment privilege should be restricted in any manner, because "in some instances it expedites the unloading of coal." The fact that free reconsignment during

car shortage emergencies also encourages the loading and constant tie-up of coal cars for which there are no purchases has apparently not suggested itself to Mr. Spens.

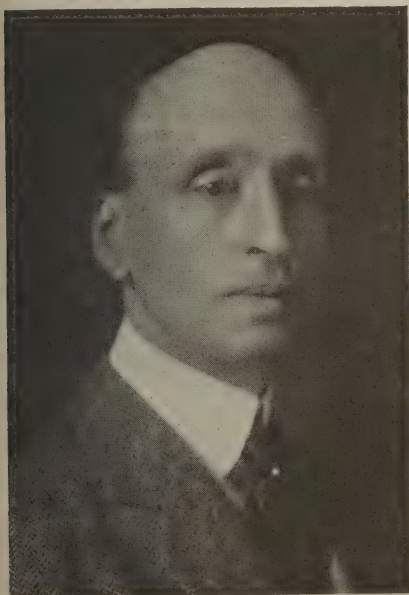
An appeal by the association for a modification of the priority orders, which also included an argument against priority orders generally, was made by the association on September 21, but up to the present time it has been impossible to obtain a definite statement from the commission as to when a decision will be forthcoming. Association officials, largely through Secretary Barrows, are in constant touch with members of the commission and are losing no opportunity to impress them with the importance of the industry and the suffering to which it has been and is still subjected.

The most serious complaints of car shortage that the association has received come from members west of the Mississippi. It is shown in some of these cases that there has been a complete denial of transportation facilities. In these cases the association is making a special effort to obtain relief, but up to the present little or nothing has been accomplished.

Mixing cement with certain types of soil to alter the characteristics of the soils and make them more suitable for road surfacing and subgrades is an experiment recently conducted by the Bureau of Public Roads, which is now proving its value in actual use. The treatment was first suggested and tried out at the Arlington Experimental Station of the bureau. Results warranted a field test, and it was arranged with the California State Highway Department to try it on the adobe soil there. A part of a Federal-aid project in Solano County was selected for the test. The dry soil was well broken up and harrowed to a depth varying from 6 to 12 inches and mixed with cement in the proportions of 1 part cement to 10 parts soil and 1 part cement to 20 parts soil. It was intended to water and roll the surface, but rain prevented. One section was allowed to remain untreated for purposes of comparison.

A recent inspection showed that the untreated section was badly broken up, due to the usual shrinkage cracks characteristic of adobe soils. The treated sections were in good condition and showed no shrinkage cracks. The treatment is not intended to make a





T. R. Barrows, Executive Secretary  
Nat. S. & G. Assn.

hard surface like concrete, but to alter the properties of the soil so that it will be stable and lessen the effects of moisture. California plans to conduct additional experiments, which will be observed in detail by the bureau and cost data obtained.

Greater standardization of practice in the design and construction of highway bridges is urged by the bureau. It is believed that there is no sound reason for the amount of variation in specifications that now exists and that it results in greater cost of bridges. State officials take the same view as the bureau and a committee composed of bridge engineers has been appointed by the American Association of State Highway Officials to consider the matter. A "Manual of Practice" is being prepared, which will represent the best thought on the subject and which it is believed will be accepted by all the State highway departments. Not only will the adoption of such a manual lead to the building of bridges of good design, but it will also make possible a saving in money, as bridge companies will not be called upon to meet so much variation in design.

## Sacks Make Trouble

### They Are Blamed for Unbalanced Conditions in New York

Something like a million empty cement bags are already impeding, and threaten to almost entirely block building construction progress in New York.

It is a situation that has never occurred here before. It is improbable that circumstances could easily bring about such a difficulty again. Furthermore, responsibility for the dilemma now confronting the eastern building construction industry is so scattered that there seems nothing else to do but to patiently await the slow return of normal trade and traffic conditions.

Soon after the anthracite strike began the cement manufacturers, being heavy consumers of coal, found it difficult to meet delivery schedules. Meanwhile empty cement bags had been accumulating in the hands of dealers following a long period of great building activity. Cement bags are good for ten cents each, four bags to a barrel, if returned, freight prepaid, in good condition to the manufacturers whose name is stamped thereon. Dealers as a rule wait until they obtain a worth while quantity of these bags and then make a lot shipment back to the mills. As a building operation will take hundreds or even thousands of bags of cement, not to mention operations allied to, but not directly identified with building construction, and dealers each frequently have a dozen or more jobs moving at the same time, the summer's accumulation of empty cement bags amounted to more than half a million for New York alone up to the first of this month.

Then the cement companies, finally enabled to obtain fuel, proceeded to turn to capacity production only to find that they were running short of cotton bags to put their cement in for shipment. When they were on the point of ordering more they were confronted with the difficulty of getting deliveries from the cotton bag mills.

When the embargoes on east-bound freight checkmated them at that point they began to send out cards to the New York dealers asking them not to hold their cement bags so long, but to

ship them back. So the dealers bundled their empty bags on trucks and took them to the railroad yards.

That is where the present serious hitch came. The railroads explained about the embargo. They were sorry but they could not accept that kind of freight, so back the bags went to the yards of the mason material dealers, almost a million strong.

Now the dealers are wondering when the manufacturers are going to ship cement to them so that they can replenish their fast diminishing supply. The manufacturers are wondering where they are going to get bags from to take care of the vast amount of cement they are manufacturing and the demand that promises this year to bring production for cement mills of the country far over the hundred million barrel mark.

## Autumn Business Good

### Pittsburgh Maintains Production and Distribution on Extensive Scale

By Our Pittsburgh Correspondent

The advance of the fall season has not shown any marked change in the activity in the sand and gravel markets at Pittsburgh, Pa., and vicinity, and all of the larger producers are maintaining heavy digging and distribution. Banner weeks in sand output have recently been recorded in this section, towboats ranging as high as 12,000 to 15,000 tons of material hauled in a seven-day period, or on a basis of from 45,000 to 50,000 tons per month. River traffic continues at a good point, with company fleets making the most of the present good weather.

Prices maintain substantially at levels which have prevailed for some time past. Washed gravel is selling for \$2.00 a yard, delivered on the waterfront, with figures of \$2.50, \$2.75 and \$3.00 for delivered material under distant hauls. For f.o.b. float stock, the quotation is \$1.60 per cubic yard. Crushed stone holds at \$2.85 a cubic yard in cargo lots, wholesale, in the Pittsburgh market, both for 1½ and ¾-inch material. Retail, dealers are asking from \$4.00 to \$4.50, with some sales as high as \$5.00. River sand is around \$2.35 for delivered stock.

The Rodgers Sand Co. is one of the active producers at the present time and is keeping its fleet exceptionally busy to and from the local port. Hauls are being made from Cheswick, Duquesne and vicinity. Large output is in progress at the company's diggers at Fourteen-Mile Island, with the "Sweetcake," "Twilight" and "Margaret" towboats doing heavy duty with barge loads of material for the Pittsburgh market. Deliveries are also being made at Duquesne and Bessemer, as well as Monessen, Rostraver and vicinity. The company has contracted to dredge about 15,000 square yards of sand and gravel at Elrana, on the Monongahela, for the construction of a new loading dock. The company has also been dredging a winter harbor at Creighton for the Crucible Fuel Co. The sand digger, "Flora," has been busy at Woodlawn and Ambridge.

The Keystone Sand & Supply Co. has been engaging in the Twelve-Mile Island section, using its towboat, "Peace," for hauls to the Pittsburgh ports. The different sand diggers are running under normal output, and heavy distribution is under way for a number of interests. The company has contracted with the Dravo Contracting Co. for the construction of three new barges for its river traffic.

The Iron City Sand Co. is keeping its sand digger, "Independent," in active service on the Monongahela River, at the foot of Wood Street, with the towboats, "Victory," "Iron City," and "P. M. Pfeil," making large hauls from this point. Deliveries are being made at a number of distant points, including Morgantown, W. Va. The gasoline towboat of the company, "Relief" is also in active service.

The Standard Sand & Gravel Co., Wheeling, W. Va., is one of the busy companies in this district, and is adding to its fleet in anticipation of extended operations. The new boat will be known as the "Sandow," and is being built by Mozena Brothers. The machinery will be installed by the Marine Mfg. & Supply Co., Pittsburgh.

The Niagara Stone Products Co., Bellefontaine, Ohio, has been incorporated with a capital of \$200,000. The plant will open about the first of November and it is planned to open a magnesia plant in connection with the quarry about the first of the year.



## Foresee Steadier Trade

### Cincinnati Sees Many Hopeful Features in the Business Outlook

By Our Cincinnati Correspondent

Basic material operators in the Cincinnati district are growing optimistic under conditions which hold a firm market for future transactions. Operations have been severely handicapped by disarranged railroad service, an acute shortage of railroad cars greatly impeding production and shipment on contracts during the past weeks. With the railroad difficulties showing indications of improvement, pit and quarry operators as well as building material men foresee steadier conditions, broken only by the regular seasonal interferences.

An encouraging opinion barometric of conditions in the sand, gravel and cement industry, indicative of a future volume of business, is the forecast of George Doran, of the Cincinnati Quarries Company, who declares that although demands for spring are not as great as may have been hoped for, the trade will not suffer because of the retrenchment policies of municipalities as has been the past experience of the last two years. According to Mr. Doran cities which have been conserving their financial resources through cutting down of street repairs have seen the folly of allowing streets to deteriorate and now appreciate that immediate repairs are necessary.

With the largest scale of building operations experienced in many decades being rapidly advanced in Cincinnati, building material operators have been enjoying a maintained volume of business. This is attested to by J. Cornell, of the Red Bank Gravel Company, who says that the building boom has saved local producers from considerable loss, counteracting the bad effects of the railroad conditions.

Materials cannot be shipped nor secured according to F. F. Brockamp of the F. F. Brockamp Supply Company, who looks to the picking up of residence construction as the most encouraging point in his favorable outlook.

That the railroad situation is not as bad as in other localities and that the "outlook is favorable" is the statement of E. Zimmerman of the Ohio Gravel

Ballast Company. Considerable business is booked ahead and contracts are being filled fairly successfully according to the Ohio Gravel Company's report. "Cincinnati, as a railroad center of north and south, has afforded an exchange of railroad equipment which basic material producers have used to advantage," is the way Cincinnati has profited, declares Mr. Zimmerman. Two of the seven operations of the company are closed with the remainder to be stationary December first, with further shipments to be made from the company's storage pile.

The railroad strike has directly affected demand for crushed stone and ballast, the roads making little or no track repairs.

The price of Gypsum remains firm, Port Clinton material prices at \$13.90 per ton in paper sacks. The shipment of gypsum has been curtailed through shortage of cars, gondolas and cattle cars being the source of conveyance to carry this product from the operations.

Little supply and keen competition is the report emanating from The McGamman Bros. Company on the cement and lime market, the price of lime approximating around \$12.40 a ton. Ruebel, Weaver and Koenig Company confirms the firm condition of the market and look for brisk prices.

Basic material men assert that the time for contractors to build is the present and speculative contracts for the future with the expectance of lower prices in builders supplies is a false principle.

## Slate Investigations

The slate inquiry begun by Dr. Oliver Bowles, mineral technologist of the Bureau of Mines, has been completed. The study involved visits to practically all working quarries and finishing plants in the country. The purpose was to promote efficiency and waste elimination in the industry and to find uses for unavoidable waste. Several short reports were issued and a final bulletin was submitted for publication. An important development was the establishment of a National Slate Association for the exchange of ideas, for improvement in the conditions in quarries and mills, and for development of the transportation, distribution, and sale of finished products.

## Labor and Transportation

### These Are Limiting Factors in Cement Trade—Other Notes of the Mills

Cement production in the Lehigh Valley district of Pennsylvania continues at a high point. Practically every large mill is running at capacity or as near to this point as possible. The two distributing factors in the situation are labor and transportation. Men are growing exceedingly scarce, and there is a keen bidding for labor; no man willing to work need be idle in this section at the present time. The present situation has been brought about by workers leaving their jobs in the mills and securing work at high wages in the coal mines and neighboring steel plants. To offset the condition, general wage increases have been placed into effect at the majority of mills.

The railroad embargo does not improve the situation, and all cement-carrying roads in this section are now holding to a curtailed hauling schedule. As a consequence, stocks are accumulating at the plants which, in reality, should be in the hands of consumers and dealers. When the condition is relieved, the shipments from the mills are expected to reach record-breaking proportions.

The fuel question is righting itself in a satisfactory way, and all mills are now in position to go ahead in this connection without any great concern. The incoming shipments of coal are allowing reasonable reserve. A number of the smaller mills are now able to resume under full production, following several weeks of curtailment.

Prices continue to advance, and a mill base of \$2.25 has been established for the Lehigh Valley district, as compared with a rate of \$2.20 a month ago, and previous to that, \$1.90. This tendency to high levels has been prophesied in recent issues of PIT AND QUARRY, and the maximum does not as yet seem to have been attained, at least a stable figure for the winter months.

The Atlas Portland Cement Co., Northampton, Pa., is running under heavy production at its large local mill. The plant has been so busy that the customary plan of shutting down for a day for the district fair, held at

Catasauqua late in September, was abandoned. Wages have recently been advanced at the plant for all classes of mechanics and laborers. The fuel situation is good at this mill, and reserves on hand insure continuous production to all desired extent. The accumulation of cement stocks will be materially depleted as soon as rail facilities are available.

The Lehigh Portland Cement Co., Allentown, Pa., has resumed full production at its plant following the settlement of a strike of operatives. The company has granted a 20 per cent wage increase, affecting all classes of labor, or approximately 700 men; the employes have no union. The New Castle mills are running at maximum, with shipments at the highest allowable point. The mill is said to have heavy orders on hand, insuring continuous operation for an indefinite period. The other mills of the company are on the active producing list. The company has perfected plans for its proposed expansion covering the construction of a new plant in Alabama, of which further mention is made below.

The Whitehall Cement Mfg. Co. is operating at good capacity at its mill at Cementon, Pa., with employment of close to normal working force. Every effort is being made to keep the number of employes sufficient for all departmental operations. The mill has a good volume of orders ahead, and is expected to continue on the present basis for a considerable time. The company has recently awarded a contract for the construction of nine new cement storage bins of silo-type, to increase the facilities for reserves.

Members of the Engineers' Club of the Lehigh Valley made a tour of inspection of a number of the cement mills, on the occasion of a recent meeting.

The Edison Portland Cement Co., Edison, N. J., is maintaining continuous production at its local mill, and a fair proportion of the output is devoted to export account. Domestic business is holding up well, and there is every indication of capacity operations for some time to come. The company has recently placed a wage advance of 5 cents per hour into effect, benefiting approximately 600 employes. In connection with the increase the company points out that men at the plant are now receiving more than 60 per cent in additional



wage as compared with the pre-war scale.

The Glens Falls Portland Cement Co., Glens Falls, N. Y., has arranged for an increase in capital from \$600,000 to \$1,200,000, for proposed general expansion. The local mill is in active production with employment of regular working force.

The International Cement Corporation, New York, N. Y., is resuming production at its Knickerbocker mill, following a curtailment caused by the coal and railroad shop strikes. The mill is now said to have sufficient fuel on hand for a good period ahead, and incoming orders will be handled with prompt dispatch. The working force has recently been increased, and is now understood to be close to normal.

The Security Cement & Lime Co., Baltimore, Md., has work under way on extensions and improvements at its cement mill at Security, Md. The company will install considerable new machinery and operating equipment to provide for an increase in output from 950,000 barrels to 1,400,000 barrels per annum. The local site comprises close to 150 acres of high-grade cement rock, which is estimated to provide a sufficient supply for the plant for more than 100 years to come. Arrangements have been made for a note issue of \$300,000, to be used in connection with the expansion. Loring A. Cover is president.

The Louisville Cement Co., Louisville, Ky., has active work under way on the rebuilding of its mill at Speed, near Jeffersonville, Ind., which was partially destroyed by fire last July. In connection with the reconstruction it is planned to increase the former output of 1,800 barrels per month to 2,500 barrels, and considerable additional machinery will be installed for this purpose. A portion of the plant has been placed in service. The rebuilding and expansion is estimated to cost in excess of \$300,000, or the amount approximately of the fire loss.

The Lehigh Portland Cement Co. has commenced preliminary work in connection with a large new plant on property previously acquired, about five miles from Birmingham, Ala., at a place known as Tarrant City. The tract comprises close to 500 acres of limestone properties; the initial mill will consist of a number of buildings, to be equipped for a maximum capacity of 1,000,000 barrels per year, and

is estimated to cost approximately \$2,500,000. The company now owns 15 cement mills in different parts of the country, a number being located at West Copley, Ormrod, Fogelsville and New Castle, in the Lehigh Valley section of Pennsylvania; and others at Mitchell, Ind.; Oglesby, Ill.; Mason City, Ia.; Fordwick, Va.; Iola, Kan.; and Metaline Falls, Wash. Headquarters are at Allentown, Pa.

The Phoenix Portland Cement Co., Nazareth, Pa., has active construction in progress on its proposed new cement mill, in the Birmingham, Ala., district, where a tract of land of about 80 acres recently has been acquired from the Sloss-Sheffield Steel & Iron Co. The initial plant unit is expected to be ready for operation late in the spring of the coming year. It will have an aggregate capacity of close to 1,500,000 barrels per year, and will represent an investment of approximately \$2,500,000. The plant will be modern in every respect, and will be designed with view to early future extensions.

The Southwestern Portland Cement Co., El Paso, Tex., has concluded negotiations with the Chamber of Commerce at Phoenix, Ariz., for a local site for the construction of a new cement mill. Plans will be placed under way at once for the initial plant units, to consist of a number of buildings, including power plant, mechanical buildings, etc., estimated to cost in excess of \$1,000,000. It is proposed to expand the works in the future.

Prices for cement in the different important mill districts are holding fairly uniform with a slight advance in certain localities. The tendency is for a nominal increase in prevailing mill bases, and before the close of the year a number of changes in this respect are anticipated. Present quotations are as follows: Universal, Pa., \$2.00 per barrel in carload lots, without bags; Fordwick, Va., \$2.35; Mitchell, Ind., Mason City, Ia., LaSalle, Ind., and Hudson, N. Y., are holding at the last noted figure, the Hudson rate recently advanced to this point from a previous \$2.10 level. The base at Hannibal, Mo., is \$2.00; at Leeds, Ala., \$2.10, and at Steelton, Minn., \$1.95. An increase at the latter place is looked for momentarily.

The Williams Lime Mfg. Co., Wilmington, N. Y., has been incorporated with a capital of \$100,000.

## Road Show Coming

### Arrangements Going Forward for Convention and Exhibit in January

With the early start that was made during the summer through a partial reorganization and an election of officers in the American Road Builders' Association and the creation of the Highway Industries Exhibitors' Association to bring about closer cooperation, arrangements are rapidly being perfected for the Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show to be held in Chicago, January 15, 16, 17, 18 and 19, 1923.

The early beginning has enabled those in charge to perfect a working organization so harmonious and effective that conditions nearly 100 per cent perfect are assured for the next big double event. While many of the most important features of both congress and show will be retained, others both new and novel will be added.

It is the intention to separate the congress and show, by holding the former at the Congress Hotel and the latter as usual at the Coliseum. It is believed this arrangement will be more satisfactory as it will obviate the necessity of shutting down the operating machinery during the sessions and will eliminate the noise that has proved so annoying to speakers and delegates at the convention. The new arrangement is also expected to increase the attendance at each session of the congress.

Shortly after his election, Thomas J. Wasser, president of the American Road Builders' Association for 1922-1923, appointed to the Executive Committee the following: Charles M. Upham, state highway engineer for North Carolina; James H. MacDonald, consulting highway engineer, New Haven, Conn., and J. H. Cranford of the Cranford Paving Company, Washington, D. C. By reason of his position as secretary, E. L. Powers became ex-officio a member of the committee.

This committee, acting for the A. R. B. A., appointed Messrs. Upham and MacDonald, and the Highway Industries Exhibitors' Association designated its president, S. F. Beatty, vice-president of the Austin-Western Road

Machinery Company of Chicago, to act as a committee having general charge of the arrangements for both the show and the congress. The committee is known as the Convention and Show Committee.

This committee has now created several sub-committees to have charge of the various detailed arrangements as follows: Transportation Committee, Royal M. Allen, chairman; General Publicity Committee, S. T. Henry, chairman; Chicago Press Committee, W. R. Harris, chairman; Exhibitors' Committee, C. R. Ege, chairman; Entertainment Committee, A. C. Cronkrite, chairman; Reception and Hotel Committee, John B. Hittell, chairman; Registration Committee, L. S. Louer, chairman; Banquet Committee, Joseph R. Draney, chairman; Program Committee, E. J. Mehren, chairman.

The Exhibitors' Committee has employed a professional director of exhibits in C. W. Kelley of Chicago, who, though never before identified with the road show, has managed some of the biggest expositions in the country, and the Publicity Committee has re-engaged C. S. Lee of New York, who handled the publicity work for the shows and conventions in 1921 and 1922.

"The program for the Congress as it is being worked out by the Program Committee, will be the exact reversal of our previous ones. Instead of avoiding controversial subjects as in the past the program next year will be made up almost entirely of controversial subjects of interest to the road-building industry as a whole. This, we believe, will greatly increase the interest in the program and will provoke highly interesting and instructive oral discussions from the floor."

The American Road Builders' Association has opened new offices at 37 West Thirty-ninth Street, New York City, the old ones at 11 Waverly Place having been abolished. Headquarters will also be opened in Chicago long in advance of the congress and show.

The Relief Hill Consolidated Gravel Mining Co. has been incorporated at San Jose, Calif., with a capital of \$75,000. Incorporators: L. H. Helwig, C. E. Landsburg, R. G. Landsburg, Eleanor Z. Helwig and Ethel A. Helwig.



## All Depends on Builder

### Way He Places Orders Will Control Prices for 1923

(Dow Building Report, New York Oct. 7)

Building costs, as affected by building material prices, in 1923 will be higher or lower than they are at present in proportion to the volume of forward business placed now.

If the building construction industry of the country anticipates the pending building material production jam by forward buying, prices will hold at or about present levels. Should there develop, on the other hand, a tendency on the part of investors in general to await possible building material price crashes in December, January or February, the consequent over-loading of building material manufacturing capacity may be expected to put further premiums upon the basic building commodities.

Building material production capacity was nearer its national maximum of orders this year than at any time, so far as records show. Fuel and rail difficulties interposed to prevent complete filling of these orders. There is a tremendous quantity of this back-log material ready to be shipped, but there is a car shortage of increasing dimension that is already affecting actual construction work. On October 1 there were buildings all ready for the tenants to move into, but which could not be passed because certain equipment deliveries had been delayed.

Meantime great quantities of construction work projected last spring are now ready for basic materials. Dealers have less than a week's supply of cement on hand although they anticipated far back in the early summer just such conditions as now exist. They filled their yards with more basic materials than they had carried in years and even then finishing lime could not be supplied fast enough, brick was frequently unobtainable, certain lumbers were not purchasable because dealers could not get them for immediate delivery and now cement is becoming not only difficult to obtain in New York, but in practically every city in eastern part of the country.

Cement and even hydrate finishing lime manufacturers are shipping at buyers risk these perishable products in open gondola cars, with tarpaulin

covering, an expedient developed during the greatest wartime demand for cars and railage and motor truck caravansaries bearing building materials from mill centers are again being met with at night upon roads leading to New York.

Projected building construction covering the Atlantic seaboard has been one-fifth greater than it was at this time last year. In some sections all previous plan filing records have been exceeded. Besides this great volume of new work there is the back-log of last spring's projected building that had to be deferred on account of uncertainty regarding delivery of materials on schedule time during and after the strikes.

Taking cement as an illustration, manufacturers of this commodity say that while this year will mark the industry's high peak of demand, next year's requirement as now foreseen, will far surmount it.

Too many investors in building enterprises will walk into this building material production jam next year to make the outlook healthy. They are waiting for a season of lower prices.

Six months ago they had a fair chance of realizing their anticipations. Today conditions are different. Then manufacturers were beginning to catch up with their orders and could foresee a season when they could pile up reserves, a condition that has not been known since 1912-13. Lack of fuel and disjointed railway service blighted these hopes for building material producer and consumer alike and the condition of Atlantic coast building material supply at this moment is on a parity with the crucial periods of the war time demand, with this difference: everybody knew the war time rush was drawing to an end, whereas now everybody knows that backed by a period of national inflation, expected to result from the great crops harvested this year, the demand for building materials is only just developing.

Building costs for 1923 are in the 1922 builders' control. If they will spread their orders for building material requirements over the winter months so that manufacturers can make their production schedules up early and provide for sufficient capacity, prices of building materials will be kept within reasonable bounds next year.

## Big Blast at Bethlehem

### Brings Down 100,000 Tons of Flux for Steel Plant

A large blast was recently made in the flux stone quarry of The Bethlehem Steel Company, located across the Lehigh River from the big Bethlehem plant. Hercules dynamite was used for the shot, which consisted of 51 well-drilled holes averaging over 80 feet in depth. The shot, witnessed by coal producers of that section and by a number of quarry operators, was—but let the editor of *The Hercules Mixer* tell it in his own way:

"Our service men, whose calculations carried them past midnight, arose in time to start directing the loading of the holes at 7:00 a. m. A number of crews were organized to accomplish this work.

"A dolly, which is a piece of wood about four feet long, attached to a rope, was used, first, for determining the condition of the holes and checking their depth before loading, and, second, for tamping the charges and stemming material. Sixty per cent Extra L. F. was used in the bottom and Special No. 1 in the top of holes. Until the dynamite charge came above the water level, the cartridges were dropped into the hole without slitting them. After the water level was passed, the cartridges were slit and their contents poured in through large funnels which were placed in the iron pipes used for casing the collars of the holes. Hercules Special No. 1, in 4x12-inch cartridges, in the calculated quantities, was charged on top of the 60 per cent Extra L. F. In some cases, where the holes were too far below grade they were filled with screenings to give an average depth of the holes of about 8 feet below the quarry floor. The rope by which the dolly was lowered into the holes was marked at 25, 50, 75, and 100 feet, so that the progress of loading could be judged at any time. To lower the cordeau, a cartridge of 60 per cent Extra L. F., 4x8 inches, was fastened securely to the end of the cordeau and carefully lowered to the bottom of each hole. Then the dolly was let down to determine whether the cordeau had reached the bottom. The cordeau was then cut off about six feet above the top of the hole and securely fastened. Deck load-

ing was employed wherever necessary: that is to say, the explosive charges in the holes were separated by layers of stemming where it was thought advisable. The distance of the holes from the face, the relative hardness of the formations at different points, the spacing of the holes, the total charge per hole, and the desired height of the charge in the hole, must be considered in deciding on the most advantageous deck loading. The experience and judgment of the man in charge must be relied upon in this phase of the preparatory work. If the charges are properly spaced in the hole, greater efficiency is obtained from the explosive and the rock is broken better for loading into cars. The work was done by four crews of about four men each, with a man directing each crew.

"Loading the holes was a full day's job. It took some time for the men in the different crews to get organized and to understand just what they were to do; as the day progressed the speed of loading increased. By the time the holes were all loaded and tamped, the quarry bench cleaned up, and the cordeau connections made, it was after six o'clock.

"Then came the blast. One electric cap was connected to the end of the cordeau and fired by a blasting machine. Like a pile of building blocks pushed over by an impatient child, the great quarry face tumbled down, the rocks spilling over one another and settling at a comfortable angle of repose at the base. The nearby highway, railroad tracks, and high-tension transmission line were not touched by flying rock, so correctly had the charges been calculated. By this shot 22,000 pounds of Hercules dynamite broke down 83,671 tons of limestone, or almost 4 tons of stone per pound of dynamite.

"No thinking person can fail to pause for a moment's deep reflection when he sees nearly 100,000 tons of stone broken down in an instant into pieces small enough to be loaded into cars. It is an overwhelming demonstration of the power of dynamite—the great constructor of civilization—which has been so aptly termed by Mr. Bacchus 'the New Alladin's Lamp.'

The Southwestern Rock & Gravel Co., Los Angeles, Calif., has been incorporated with a capital of \$75,000.



## \$10,000,000 for Material

### Los Angeles Spends This Amount in Its Building Program

From the Los Angeles Express

Ten million dollars is paid out annually to the producers of rock, gravel and sand, which goes into the construction of buildings in Los Angeles county. Approximately 15,000,000 yards of these raw materials are needed each year to meet the demands of local contractors.

These figures are taken from cost distribution sheets of the Builders' Exchange of Los Angeles, prepared by Secretary Roy H. Brown. According to Mr. Brown, the demand is as yet only in its infancy. Building now under way and contracts already planned have reached the peak in the building history of this section and indicate requirements in raw materials which will tax producers to the last ounce of their productive energy in machinery and men.

Figured in weight, it takes approximately 60,000 tons of these natural products to meet daily needs. Down-town construction is now almost totally confined to class A structures, in which concrete and steel are the basic elements in material. Cement, lime, rock, gravel and sand are the four necessary ingredients in the making of concrete, and to the class A building may, in consequence, be attributed this unprecedented demand for the raw products of Mother Earth.

Sand leads all the other elements in demand. City specifications, which lead that concrete shall be mixed in the proportion of three and one-half parts of crushed rock to two and one-half parts of clean, sharp sand and one sack of cement, might convey the impression that rock was in leading demand.

On the contrary, there is about three times more sand used than rock in local building operations, due to the fact that the plaster which goes into construction of every character has lime and sand for its chief ingredients.

In compiling these figures Mr. Brown has given no thought to the needs of road and highway construction, where material necessary for use is ordinarily available close by.

## Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,429,372. Sand and gravel loader. Jesse M. Shamp, Wooster, Ohio.

1,429,786. Rock-drill. William A. Smith, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,430,075. Scraper. Leslie P. Green, Chicago, Ill.

1,430,076. Excavator. Leslie P. Green, Chicago, Ill.

1,430,297. Rope-thrusting shovel. Walter Ferris, Milwaukee, and Svante R. W. M. Bager, South Milwaukee, Wis., assignors to Bucyrus Co., South Milwaukee, Wis.

1,430,298. Rope-thrusting shovel. Walter Ferris, Milwaukee, and Svante R. W. M. Bager, South Milwaukee, Wis., assignors to Bucyrus Co., South Milwaukee, Wis.

1,430,493. Rock-cutting machine. John W. Cook, Miami, Fla.

1,430,521. Mining-machine. Morris P. Holmes, Claremont, N. H., assignor to Jeffrey Mfg. Co., Columbus, Ohio.

1,430,522. Mining-machine. Morris P. Holmes, Claremont, N. H., assignor to Jeffrey Mfg. Co., Columbus, Ohio.

1,430,669. Mining and loading machine. Edmund C. Morgan, New York, N. Y.

1,430,764. Rock-drill. William A. Smith, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,430,782. Lip for dredge-buckets. Leonard G. Attenborough, Ipoh, Perak, Federated Malay States, and John F. Newsom, Palo Alto, Cal.

1,430,790. Rock and sand heater and grader. Jesse J. Brown, Hayward, Cal.

1,430,942. Engine trip for steam shovels. Chester A. Chancellor, Loren G. McMannama, and Carley E. Houghton, Mindenmines, Mo.

1,430,975. Sand and gravel spreader. Anthony Fricker, Cleveland, Ohio.

1,430,984. Drag-line cableway excavator. William E. Hale, Detroit, Mich.

1,430,985. Bail for skip-hoist buckets. William E. Hale, Fort Washington, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa.

## Shovel Operating Cost

### This Question To Be Settled by Prize Contest Announced By Manufacturer

The Erie Steam Shovel Company expects to render a real service to all owners of excavating equipment by getting together many actual maintenance cost records and publishing them in detail. To secure these actual records they have just announced a prize contest, prizes to be awarded for the best upkeep records. There are twenty prizes, ranging from \$100 and a Waltham watch for first prize, \$50 and a Waltham watch for second prize, down to \$5.00 for twentieth prize. In addition, \$5.00 will be given for every record that does not win a prize but is published.

Contractors have from time to time accused equipment manufacturers of too much optimism in giving out figures on maintenance costs. The Erie Steam Shovel Company now proposes to remove all doubt about actual upkeep costs.

The judges of the contest will be **Arthur S. Bent, of Bent Bros., the well known contracting firm of Los Angeles, Calif., Halbert P. Gillette, editor of Engineering and Contracting and author of the "Handbook on Excavation Costs" and many other works on costs; and A. C. Vicary, vice-president of the Erie Steam Shovel Company, mechanical engineer with many years of specialized experience on steam shovel work.**

The prize contest closes December 31st. Records may be sent in by steam shovel owners, managers, or any employee in direct contact with steam shovel work. In every case, however, the record must be accompanied by a written statement from the owner of the machine to the effect that the figures submitted are correct to the best of his knowledge. The record should include approximate number of days the machine has worked, yardage moved, and class of materials, and all upkeep costs exclusive of cable, dipper teeth and grate bars.

Complete information concerning this contest can be secured from the Erie Steam Shovel Company, Erie, Pa.

## Oil Engines for Dredges

At the National Drainage Congress held in Kansas City in September, the use of oil engines for dredges was the subject of a paper by Geo. B. Massey consulting engineer, Chicago, a summary of which has been given by *Engineering News-Record* as follows:

In dredges operated by oil engine the engine may drive the machinery directly by means of clutches or it may drive an electric generator supplying current to motors for the different mechanisms. In the former case a belt drive is usually employed owing to the distance from the engine to the machinery. In the latter case there may be one main generator or a separate generator for each motor. Although this second arrangement is more expensive it uses less power since no resistances are required for control. In fact it is considered better than a steam engine in the relations of torque and speed. On a dipper dredge the oil-engine occupies the position of the boiler in a steam machine.

Most of the oil-engines used in this class of work are of the semi-Diesel type, and in the vertical engines the air for scavenging the cylinders is compressed usually in the crankcase to about 2 lb. pressure. A modified horizontal design has a separate compressing chamber, which arrangement permits of higher pressures. To start the engine, an electric heating coil is used or a torch to heat a plug in each cylinder head. With the straight Diesel engine the charge is ignited by the temperature due to high pressure of air in the cylinder.

In a two-cycle engine, firing a charge at each outward stroke, the piston acts as the inlet and exhaust valve, so that there are few moving parts. A four-cycle engine, with a charge fired at each alternate outward stroke, requires valves and camshafts. Most of the semi-Diesel engines are governed by regulating the oil charge according to the load. They have to be started usually by air at 150 to 175 lb. pressure, so that an air compressor must be attached to the main engine or driven by a small independent engine.

A little water in the cylinder permits of higher compression and increases the fuel economy, but it should not be used if the oil is high in sulphur as the combination of sulphur and

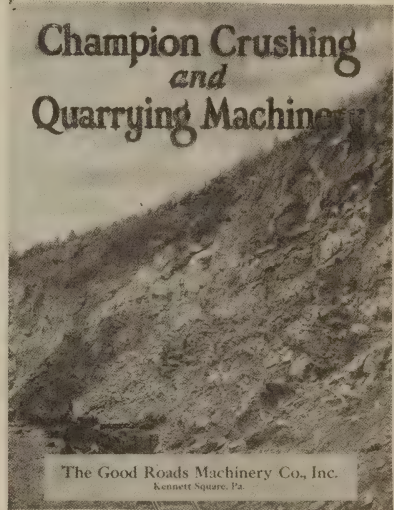


water is destructive to the cylinder walls and piston rings. Some engine builders stipulate that the oil used shall contain not more than 0.5 per cent sulphur. Oil companies have special brands of oil suitable for internal combustion engines and engine builders recommend the use of oils meeting certain specifications. The heavier the oil, the lower the price and the greater the B.t.u. Using a heavy oil in summer and a light oil in winter obviates the necessity of installing a heater to warm the heavy oil so that it will flow readily.

## New Catalog of Good Roads Machinery Co.

"Champion Crushing and Quarrying Machinery," the new catalogue of The Good Roads Machinery Company, covers very thoroughly the line of equipment that this company manufactures for use in crushed stone plants and quarries. The book begins with descriptions and illustrations of a Champion crusher which has been on the market over thirty years. Six thousand of these crushers have been put into heavy service since the first crusher was built, and no changes have been made in design. Improvements have been added to the details of construction but operating principles remain unchanged. Six pages in the early part of the book are given over to this general description of the Champion crusher, covering its various features and explaining their advantages by text and illustration. After this general descriptive matter comes the section on the number 20 Champion, which has a capacity of 110 to 140 tons per hour when the jaws are set to close to 4 inches. After the section on crushers comes a page on rock drills, illustrated by one of the machines that The Good Roads Machinery Company furnishes to the trade. Then follow two pages on the relative advantages of the jaw crusher and the gyratory crusher. The next section, that devoted to Champion elevators, is one that the company introduces by the statement that, if there is one thing they pride themselves on more than another, it is their elevator. Elevators are furnished for all classes of work and are designed to operate under all conditions. The company's revolving screens are

described and illustrated sufficiently to give a good idea of their construction. A number of pages are devoted to portable outfits, to the winding drum and dump car, to rubber belt conveyors, to chutes and gates for bins,



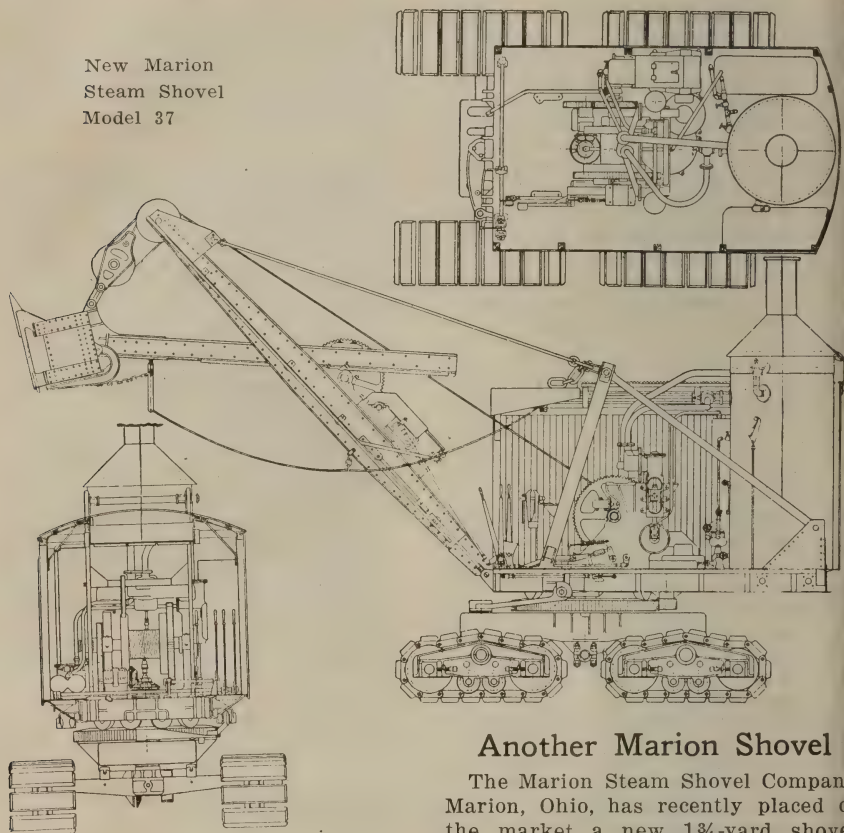
and finally to engines and boilers. Six pages at the end of the book are devoted to useful statistical information and to views of plants in which equipment furnished by The Good Roads Machinery Company is in use.

In the preface to the catalogue the company draws attention to the fact that a competent and experienced corps of engineers are always at the service of customers. The company designs, builds, and installs any kind of rock crushing, elevating, screening and conveying plant that may be called for. They have studied and worked with machinery of this character for more than thirty years and are well qualified to pass upon any problem that may arise in the construction of a crushing plant.

Copies of "Champion Crushing and Quarrying Machinery" may be secured by writing The Good Roads Machinery Company, Kennett Square, Pennsylvania.

The Bay City Dredge Works, Bay City, Mich., have made arrangements with the R. H. Hyland Company, 323 North Wells Street, Chicago, for this company to act as their representative for Chicago and vicinity.

New Marion  
Steam Shovel  
Model 37



### New Sales Engineer

Mr. J. B. Clark, Jr., has recently become associated with the Pennsylvania Crusher Company as sales engineer, and will have charge of the New York office, Hudson terminal, 50 Church Street, New York City.

Since graduating from the Engineering Department of Penn State, Mr. Clark has had broad experience in plant erection and operation.

The Link-Belt Company of Chicago, Philadelphia and Indianapolis, announces the completion of a new General Catalog No. 400, which embraces their entire line. It contains 832 pages, is cloth bound and can be obtained from any Link-Belt Branch office. This catalog not only includes the complete Link-Belt line, but also the products of the H. W. Caldwell & Son Company plant of that company.

### Another Marion Shovel

The Marion Steam Shovel Company, Marion, Ohio, has recently placed on the market a new  $1\frac{3}{4}$ -yard shovel. This shovel is described and illustrated in Bulletin No. 304, which is now ready for distribution.

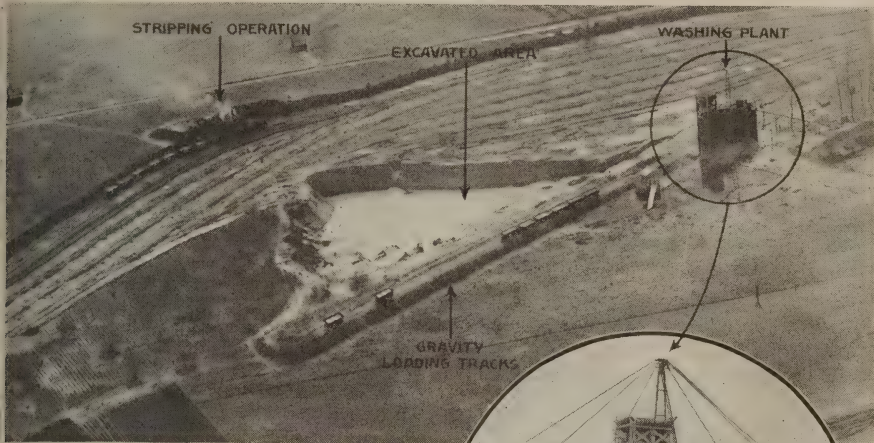
It is known as Model 37 and carries as regular equipment a 25-foot boom, 17-foot dipper handle and  $1\frac{3}{4}$ -yard dipper.

It is readily convertible into drag line, clam-shell or orange-peel excavator, or material handling crane, and can be furnished with either rigid or flexible crawler, mounted traction wheels or railroad wheels.

This is the company's largest model in this type and it is easy to handle and recommend for its absolute reliability.

The Rochelle Washed Gravel Co., a company formed by Mr. C. W. Clark and Fred E. Gardner, has leased a gravel deposit four miles south of Rochelle, Ill. The equipment is being installed.





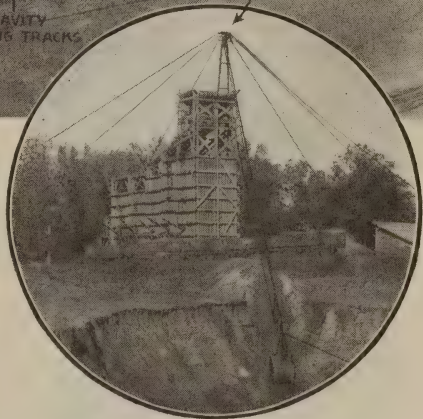
Premier Sand and Gravel Company  
Birmingham, Ala.

## CLEAN GRAVEL BETTER CONCRETE PERMANENT ROADS

**G**OOD concrete construction depends upon clean sand and gravel, properly graded, and free from vegetable matter and other foreign substances.

The airplane view above shows a modern plant for screening and washing sand and gravel.

A steam shovel strips the overburden and loads it into cars. The gravel is excavated with a dragline cableway bucket which dumps into a Link-Belt washing plant.



Three sizes of gravel and two sizes of sand are produced. The Pittsburgh Testing Laboratories report of concrete made from this product gives it a tensile strength of 137% and a compression test of 111%, which means good concrete and roads that are good when the bonds are retired.

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# LINK-BELT

## Sales Manager of Northwest Engineering

C. R. Dodge, well known throughout the construction and contracting field, has become sales manager of the Northwest Engineering Co., Green Bay, Wis., manufacturers of Northwest crawler cranes, draglines, shovels, and similar equipment, with general sales office at 28 East Jackson Blvd., Chicago.

Before accepting the present connection, Mr. Dodge was western sales



C. R. Dodge

manager for the Lakewood Engineering Company, with which concern he was connected for five years.

It was to strengthen the sales organization, in order to handle the increased volume of business brought about by the announcement of the new Northwest gas or electric shovel and other recent improvements, that Mr. Dodge's services were sought by the Northwest Company.

Mr. W. W. Mutter, vice-president, who has formerly handled the sales organization, is turning his attention to production and special problems.

The San Bernardino Valley Lime & Rock Company, San Bernardino, Calif., has been incorporated with a capital of \$200,000. The incorporators are J. D. Baugh, J. W. Bates, M. P. Bates, Julia Baugh and Fred A. Wilson. The company will engage in the mining and producing of rock and limestone for building and commercial purposes.

## Power Exposition

The National Exposition of Power and Mechanical Engineering to be held at the Grand Central Palace in New York, December 7 to December 13, is being planned in cooperation with the national societies interested in the economy of fuel and in the production and use of power generated therefrom.

The opening of the Exposition in the Grand Central Palace will take place on the closing day of the Annual Meeting of the American Society of Mechanical Engineers, and time has been set aside in the A. S. M. E. program so that members desiring may attend the opening exercises. Furthermore, the programs of the twenty sessions to be held at the A. S. M. E. meetings have been so arranged that all members attending the meeting may reap the advantage of the technical discussions, and with the smallest possible expenditure of time, enjoy the novel and varied exhibits at the Exposition.

## Gasoline Locomotives in Three Sizes

The Mid-West Locomotive Works, Cincinnati, Ohio, successors to the Burton Engineering & Machinery Co., are planning to manufacture gasoline locomotives on a larger scale than was done by the Burton company. These will be made in three different sizes—4, 6, and 10 ton, and perhaps larger. Mr. Armstrong is president of this company and Mr. J. C. Meyer is secretary.

Mr. Martin Uldhall of San Francisco has taken a lease on a large deposit of gypsum at Ludwig, Nevada. Men are already at work cleaning up the plant and preparing a quantity of the crude gypsum for shipment. Mr. Uldhall plans to erect a refining plant with a daily capacity of 150 tons, which he expects to have completed in the early part of next year.

The Clear Lake Sand & Gravel Co., Clear Lake, Iowa, is planning to purchase new machinery and equipment and install in the plant during the winter. This will enable them to almost double their output for the past year. The company expects to float a bond issue to the extent of \$30,000, which will be disposed of locally to finance their needs.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7

CHICAGO, ILL., DECEMBER, 1922

No. 3

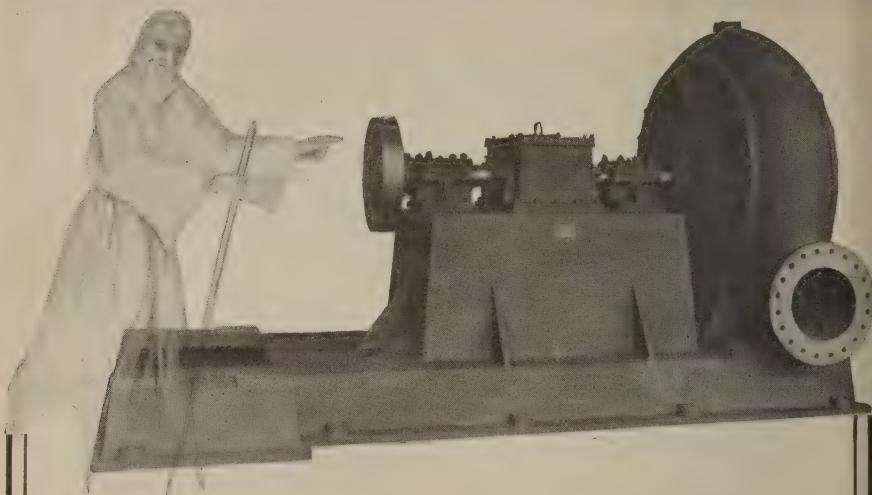
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Contributors and advertisers should have copy in the office by the 15th of month preceding publication.



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Your pump is a vital factor in your season's profit. Its performance often means the difference between profit and loss.

When you buy a Morris pump you run no risk of uncertainty in performance. Morris pumps are backed by the proof of performance in hundreds of plants. Many have written as does the Arkansas River Sand Co., saying—

"We have pumped something like 6,000 cars of sand with our Morris pump, with only \$7.00 expense and about 15 minutes time for repair."

Let us tell you more about the experiences of Morris pump users—real letters from men whose food, clothing and profits have depended upon the performance of their Morris pumps. Write today.

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# MORRIS-PUMPS



# Pit and Quarry

Member Audit Bureau of Circulations

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CHICAGO, ILL., DECEMBER, 1922

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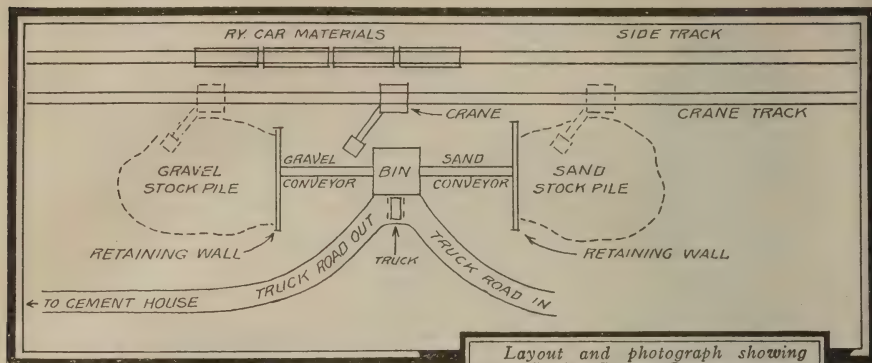
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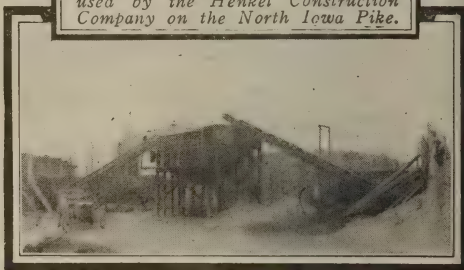
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Layout and photograph showing how Barber-Greene Conveyors were used by the Henkel Construction Company on the North Iowa Pike.



## How Barber-Greene Conveyors Worked on the North Iowa Pike

### *Laying 5 miles of 18 foot road in record time by employing efficient material-handling methods*

On a section of the North Iowa Pike, between Hutchins and the Kossuth County Line, the Henkel Construction Company of Mason City had an average sand and gravel haul of two and a half miles to the mixer. Fifteen trucks were operated.

To make sure of efficient handling they used the layout shown above.

The two Barber-Greene Conveyors were used to reclaim from the stock piles. Each one was served by one operator and two helpers.

Other contractors also use Barber-Greene Conveyors in place of cranes for unloading from cars.

On the Rome-Morgan road in Ohio last year, E. J. Inman of Ashtabula found that a  $\frac{3}{4}$ -ton yard crane could unload a maximum of only six cars a day into bins. Its daily average was only four cars.

At the time it didn't seem likely to him that equipment costing much less to buy and oper-

ate could do twice as much.

It was demonstrated, however, that a Barber-Greene Portable Conveyor on the same job could unload as many as twelve cars into bins, and average ten.

This year he has found that he can do without the bins.

He unloads a five-ton truck directly from the car in one and a half minutes. Without making a new set-up he pivots the Barber-Greene to unload on two stock piles.

By changing the set-up he reclaims from the stock pile with the Barber-Greene.

Other ways of using Barber-Greene Conveyors to cut costs and speed handling are described in our free book "Results on Road Jobs."

#### BARBER-GREENE COMPANY

490 W. Park Avenue, Aurora, Illinois  
Branch Offices in 33 Cities

# BARBER - GREENE

## PORTABLE BELT CONVEYORS



# Pit *and* Quarry

Vol. 7

Chicago, Ill., December, 1922

No. 3

## How About Your Winter Drilling?

IT is during the winter season that it is sometimes possible in big quarry operations to provide for handling more blasted rock during the summer season by doing a considerable amount of drilling for large blasts. This is especially true if large blast hole drills are used. The progress of such a drill through ledge rock is comparatively slow. For this reason blasting is sometimes held up and the quarry worked to a disadvantage, waiting for deep holes to be drilled.

To realize how slow this kind of drilling may be, the writer has before him eight examples of drilling with large blast hole drills in different kinds of rock in various sections of the country. A record is given of the kinds of rock and the average footage drilled per hour.

| No.                              | Feet |
|----------------------------------|------|
| 1. Limestone.....                | 5.2  |
| 2. Dolomite .....                | 5    |
| 3. Limestone .....               | 9    |
| 4. Cement Rock.....              | 6.5  |
| 5. Limestone .....               | 11   |
| 6. Trap Rock.....                | 1    |
| 7. Shale .....                   | 10   |
| 8. Earth, shale, sand stone..... | 12.2 |

Thus in an eight hour day from 8 feet to 100 feet were averaged. This does not include the changing from one hole to another and the time used in setting up the machine.

It can thus be seen that with ledges varying from 50 to 150 feet in height and the holes spaced from 10 to 25 feet apart, that weeks and months can be spent by one machine in drilling enough blast holes to throw down a large tonnage.

Thus if the drilling for several months of the regular season can be done during the winter it is a decided advantage.

At times and in some sections of the country the drilling may be done at less cost than during the summer. If there is some overburden on the rock it may be frozen so hard that it will not interfere with the operation of the drill, nor will a short piece of casing have to be used, to prevent the soil from ravelling and dropping down into the hole.

With the ground and ledge saturated with water in some sections of the country during the winter, water will collect in the hole so that the drill will operate easier. The other quarry operations will not interfere with the drilling.

With a longer drilling season not so many drills will have to be used in the quarry.

After the holes are drilled large wooden plugs can be driven into them and allowed to remain until it is desired to make a blast. Then the plugs can be removed and the holes cleaned out.

## Winter Storage

DURING the past year there has appeared in this magazine, at the request of readers, several articles on extensive and permanent storage systems for sand, gravel, and crushed stone.

The need of such systems has been pointed out, but in many cases they are too expensive for some operations. There are also cases where plants do not need permanent storage, but only

temporary storage. This temporary storage is frequently needed during the winter months, when it is possible to carry on the plant operations but there is no immediate sale.

It is not practical to spend too much money for plant to store the materials. The actual equipment needed can be made small, depending upon the location of the plant, the highest point reached by the material and location of the available storage ground.

If the material is raised to a high elevation it may be possible to place it in storage piles by means of gravity and the use of chutes.

If this cannot be done, then it is possible to use portable conveyors to handle the stone, or semi-portable conveyor or belt, that can be located with one end under the bins, and by swinging that in a circle not only one storage pile can be made, but several of different kinds of material.

Material can be handled from one conveyor to another and thus either carried a greater distance or piled higher. For cheap storage, ground storage is always the answer.

To rehandle these stored materials either the same conveyors can be used or one of the many types of wagon loader. Also grab buckets with derricks can be used and likewise steam shovels. The entire question must be answered by what equipment the operator may already own that is suited to the work.

Even when winter is over it may be a good business proposition to use ground storage. By it the plant may be able to work to capacity, and the thousands of dollars invested in it made to pay better dividends. Large bins are expensive. With both bins and ground storage, there will be no lost time by trucks. Nor will the crushers have to stop for either a lack of cars or trucks, nor will the trucks have to wait while material is being produced.

The advantages of this ground storage is to permit the plant and the haulage equipment to operate independently; also a longer seasonal production, a smaller investment in haulage equipment, and the reduction of overhead charges. All of these things means a more profitable operation.

### Paint During the Winter

MANY pit and quarry operators will soon be shutting down their plants for the three or four severe winter months, a period of enforced idleness that means in some cases the saving of much money over endeavoring to operate under adverse weather conditions.

During these months many repairs will be made, and additions to plants built, as well as alterations that will mean cheaper operation with increased production. These will be wise measures; but there is one item that many operators overlook or forget.

That is painting. It is true that pit and quarry plants are not built for appearance, but for use, but there can be no possible objection to making a building or structure better looking by painting it. The painting of buildings certainly gives prestige to a plant and will add to the feeling that both employer and employee will have the *esprit de corps* of their organization. It will likewise attract attention from the public and will prove an asset in many ways.

It has been said that annual painting of structures pays dividends all out of proportion to the cost. This has been demonstrated by steamship owners who find that both wood and metal are preserved by paint. The harder the usage of machines and structures, the more it pays to paint. Water, steam, heat, cold, dust and dirt are sure decayers of both wood and metal.



The progress of oxidation or decay may be slow, but it is going on all the time and paints of different kinds are the only preservatives. It is true that some preservatives of wood are applied under pressure, but the surface is likewise treated so even these may be included with paints.

Today there are on the market paints of many kinds, each meant for a different and distinct purpose. The ordinary user of paint does not have sufficient knowledge of such things and is apt to use the same paint on both wood and metal, on cold surfaces or hot ones.

If surfaces are to be continually wet, especially timbers, then a damp-proofing paint or wood preservative should be used. Other wooden surfaces should be painted with a high grade house paint. Iron and steel should have some metal paint or carbonizing coating put on them. Metal that is to be heated should have a hot paint. Those exposed to gases and acids should have a special paint for that purpose.

One material used extensively around pit and quarry plants is galvanized iron. It is extremely important that this metal be kept painted. From the instant it is exposed to the weather these sheets begin to rust, due to the almost microscopic pin holes in the galvanized surface, so that paint must be applied to prevent this deterioration. Few paints will adhere for any length of time to this metal, so it is necessary to use a special paint made for galvanized surfaces.

The same thing is true about concrete surfaces. Concrete structures should be painted to protect them, and for some there must be a special damp proof paint. Paint for other materials does not adhere well to concrete. Floors made of concrete should likewise be painted and treated with hardening compounds, so as to prevent

them from dusting and to prevent cracks occurring.

Even such things as locomotives, cars, steam shovels, and other machines used away from the plant should be painted to protect them.

## Experts

EXPERTS, especially in efficiency for pits and quarries, pay for themselves as the result of their work. Thus they are never a direct expense. They effect such savings and economies that they net the operator additional profits and from such profits they are paid. And after the employment of the expert ceases, the added profits continue.

In advising operators, the expert may, by preventing one mistake, be the means of saving thousands of dollars in either capital invested or through operation. The expert has the advantage over the operator of seeing many plants and gaining experience from the mistakes of others, while the operator has only the experience gained at his own plant or plants, and he becomes accustomed to the shortcomings of his own operations, not realizing he may be wasting money.

Experts are essential in almost any industry today, for improvements are many, machinery is becoming essential and complex, and a busy operator can hardly be expected to keep posted in all matters.

PIT AND QUARRY cannot send experts to advise its readers, individually, but each issue of the paper contains much expert advice concerning many problems of installation and operation, and does give answers to any questions or problems that are sent to the editors.

To all of its readers a hearty invitation is extended to send in letters on any subject upon which information is desired.

# Stripping Problems in Limestone Quarries of Shenandoah Valley

By OLIVER BOWLES

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THE United States Bureau of Mines has recently undertaken a study of limestone quarrying for lime manufacture, in connection with which a series of short papers on various phases of the industry will be issued. The present report is the first of this series.

The purpose of these reports is to discuss conditions, methods, and equipment, in order to promote high efficiency and safety in the operation of the quarries. It is highly desirable that quarry operators and superintendents study these reports carefully, and supply the Bureau of Mines with any criticisms or suggestions that may assist in a proper solution of the problem. The bureau's representative has observed many quarries in widely separated localities, but undoubtedly a more comprehensive and helpful final report can be prepared if his observations are supplemented by suggestions from practical men who are actively employed in quarry work. It is urgently requested therefore that any reader of this report who has had experience in quarrying will write to the bureau giving suggestions.

The limestones of the Shenandoah Valley of Virginia and West Virginia are characterized by numerous solution cavities brought about by surface or subterranean stream erosion. Some form extensive caverns in which part of the dissolved calcium carbonate (limestone) has been redeposited as stalactites and various other ornate forms. Some of the caverns have been illuminated and opened to the public as commercial enterprises. In a few instances the cavities constitute a commercial asset in the Valley, yet from the quarryman's point of view they are

a decided disadvantage, for they constitute one of his hardest problems.

The quarryman's difficulty is due to the occurrence, even at considerable depth, of erosion cavities, not in the form of open spaces, but filled with red clay. These clay masses are troublesome, and their removal is costly. The problem is of general interest to all limestone quarrymen, for erosion cavities are characteristic of limestone deposits though they are not generally developed as much as in the district under consideration. In many quarries throughout the Valley the stripped rock surface is very rugged, consisting of knobs or spires of rock with irregular cavities or cracks between them. Solution has not only honey combed the surface, but it has followed joints or other planes of weakness, and thus has dissolved out seams or pockets many feet in depth. Masses of clay 30 to 60 feet in width have been observed 80 feet below the rock.

In general the clay pockets are very numerous at the surface, and are absent or greatly reduced in size at depths of 10 to 20 feet. Thus the bulk of the clay is usually found in the upper 6 to 12 feet of the rock mass; in many quarries this upper zone contains as much clay as rock, or the clay content may exceed that of rock.

Clay is a hydrous silicate of aluminum, hence if clay is burned with the limestone, a lime contaminated with alumina and silica results. For certain uses a limited percentage of such impurities is permissible, but for most purposes a high degree of purity is demanded. It is apparent therefore that a clean separation is required, and owing to the large proportion and irregu-



lar occurrence of the clay such separation is surrounded by many difficulties.

Two general methods are followed in removing the clay. The greater part of it may be stripped back before the ledge is blasted down, or clay and rock may be shot down together and separated later at the quarry floor. The first method is usually followed where a foot or more of solid clay lies above the highest points of rock. Where numerous knobs or ridges of rock are exposed at the surface, the difficulty of digging the clay from between the rock masses commonly results in the quarryman's following the second method—that of blasting down rock and clay together, and separating them while loading.

Where a large volume of clay occurs free enough from rock masses to permit the use of such mechanical equipment as the steam shovel or drag-line scraper, it is undoubtedly wiser to remove as much as possible of the clay before blasting down the rock. If the rock surface is so extremely rugged that it is advisable to use hand tools only, the relative merits of the two methods are more difficult to judge. If rock and clay are shot down together, the intimate mixture makes separation slow and difficult. In rainy weather the clay adheres to the rock fragments, and the quarrying of clean rock becomes impossible. On the other hand, in cleaning out the pockets before blasting, the clay is fairly free of loose rock fragments, and the rock subsequently shot down is clean in either wet or dry weather. In loading dirt at the quarry floor, however, the laborer is required to lift it only high enough to clear the edge of the quarry car; in cleaning out pockets from the surface, clay must sometimes be raised 10 to 20 feet. Loading in the quarry is also much more rapid as the clay is loose, whereas the firm, undisturbed clay in the pockets may require excessive use of the pick, or may

even require blasting; thus its removal is slow and expensive.

Hand loading of clay is laborious, slow, and costly. This fact is recognized by most quarry operators, but owing to the peculiar conditions in the Shenandoah Valley, the method is still widely used. The cost of loading dirt at the quarry floor in 1922 varies from 15 to 25 cents per cubic yard. Hand loading of clay at the surface varies from 30 to 45 cents a yard. The latter figure applies to direct loading of clay from the bank to the car or dump cart. The cost may be very much higher where the clay is removed from deep cavities. At one quarry observed four men shovelled the same masses of clay to successively higher benches, and the fifth man loaded it into a dump cart. Under such conditions the cost might reach \$1 or \$1.50 per yard. Owing to the excessive cost of hand loading, and its wide employment in the Valley, the Bureau of Mines, though recognizing the difficulties to be overcome, urged upon operators the desirability of seeking more efficient methods. Improved methods now employed or proposed are discussed in the following paragraphs.

Hydrauliclicking is one of the most efficient methods yet devised for the removal of overburden. Water is pumped at high pressure, and is directed against the bank through a special nozzle. The method, however, is limited in application, as certain specific conditions must be met. First, there must be an adequate water supply. Second, the quarry must have proper drainage. The most favorable condition is where the natural drainage is back from the face so that the soil may be washed away in some ravine, or other depression, where no further handling is required. In exceptional cases the soil may be carried toward the quarry face. In a quarry near St. Louis, Mo., hydraulic stripping has been successfully em-

ployed where the soil is carried across the quarry to the river by aqueduct. At a cement plant in Virginia the clay is washed to the quarry floor where it is later loaded by steam shovel and removed in cars. It is unlikely that the hydraulic method can be employed profitably except in shelf quarries where automatic drainage carries off the water used in stripping. A third condition to be met is the availability of a suitable settling basin where the soil may be disposed without covering adjacent property or contaminating streams on which other industries depend.

The hydraulic method has been used with success in the Shenandoah Valley, the cost of soil removal being not more than 12½ cents per cubic yard. The bureau has a record of a hydraulic stripping cost at a marble quarry in Tennessee, in 1916, of only 2 cents per cubic yard. In the gold districts of California where some years ago hydraulic mining was widely used the cost of handling gravel was about 2½ cents per cubic yard. As the actual gold value in much of the gravel did not exceed 3 to 5 cents per cubic yard the cost of hydraulicking must have been kept considerably below these figures. At one of the large iron mines in Minnesota very extensive hydraulic stripping was conducted about 1914 at an average cost of 6.7 cents per cubic yard including upkeep and office expense. In the Florida phosphate fields hydraulic stripping of fine overburden cost 5 to 8 cents per cubic yard in 1912. In the Tennessee brown phosphate fields hydraulic stripping some years ago cost about 7 cents per cubic yard. At a Missouri cement plant quarry visited by the writer in 1916 hydraulic stripping cost including blasting of hard soil, was about 7 cent per cubic yard. Under 1922 operating costs these figures should be increased approximately 50 per cent.

A drag-line excavator operated from a derrick arm has been used successfully in cleaning out clay pockets in Pennsylvania. The entire equipment is on a portable mounting, and the excavated material is loaded on cars just as when a steam shovel is employed. It cleans out shallow depressions fairly well, but some hand work is required in the deeper cavities. The lateral motion of the derrick arm gives the excavator a wide range and great flexibility of movement.

The simple form of drag-line scraper may be used where a convenient dumping ground is available. Though some convenient devices for shifting the sheave attachment have been devised, in general this scraper lacks flexibility in lateral motion. Its use at limestone quarries has not yet been observed by the writer.

A clam-shell bucket operated from a derrick arm or crane has been used to a limited extent in moving soil overburden. Its usefulness in removing clay from erosion cavities is not yet established, and further information is desirable.

A small tractor excavator widely used in road grading has been employed with success on eroded limestone surfaces in Pennsylvania. The dipper slides back and forth on an arm 12 or 14 feet in length, which may be raised and swung aside for dumping into cars or wagons. The excavator is so equipped that the dipper may be lowered into a pit, loading as it is elevated toward the surface. Such an adaptation permits it to be used in cleaning out clay pockets.

Several operators in the Valley have used steam shovels with success on very uneven surfaces. Rock projections so interfere with continuous operation that great patience is required, and the operator must be prepared for much lost time both in loading and in moving. The shovel will not excavate from deep pockets, hence much hand



work must follow, but where a depth of several feet of clay is encountered, the steam shovel is much more economical than hand loading. The smaller types of tractor, or caterpillar shovels with dippers not more than  $\frac{3}{4}$  yard in size, are best adapted for such work.

The actual cost of steam shovel stripping varies greatly in different localities. In the Florida phosphate fields the contract price for steam shovel stripping was 20 cents per cubic yard in 1912. At several cement plant quarries visited by the writer in 1916 and 1917 the cost of steam shovel stripping varied from 11 to 16 cents per cubic yard including transportation to the dump. The Dolomite Products Company of Cleveland, Ohio, in substituting a steam shovel for hand loading of soil overburden found that the daily cost of handling the same amount of material was reduced from \$137.50 to \$35. per day.

An interesting modification in the use of the steam shovel has been proposed, but has not yet been tried. It is suggested that rock and soil be blasted down together, the serviceable stone sorted out and removed, and a steam shovel employed to clean up the soil and waste on the quarry floor. All good stone in the waste material could be thrown aside while loading. The adherence of mud to the rock during rainy weather as previously mentioned is a disadvantage, but as waste is much more slowly loaded than good rock by hand methods, the proposed scheme has some merit.

A method now being tried in the Valley, and which according to report has been successfully used elsewhere, involves the use of the steam shovel for both rock and clay in the upper part of the deposit. The great bulk of the clay in pockets and seams is usually confined to the upper 6 to 12 feet of the limestone deposit, thus if a cut 6 to 12 feet deep is made, the

clay may be loaded into cars with a small tractor shovel having a  $\frac{1}{2}$  yard dipper, and the rock masses drilled and blasted as they are encountered. The rock thus obtained may be loaded into separate cars, but it is not deemed advisable to do so, for it is difficult if not impossible to load clean rock with a steam shovel where rock and soil are mixed. As now conducted the surface cut is at the margin of the quarry excavation, and all rock masses encountered are thrown over the edge where they are loaded at the quarry floor. This makes possible a clean separation of rock and soil.

The method as thus briefly outlined is one of the most promising yet proposed, for it permits removal of almost the entire mass of clay with the steam shovel, and leaves the underlying limestone ledge relatively clean and well prepared for ordinary methods of quarrying.

One operator plans to erect a washing plant, and in the writer's opinion this is the best solution of the stripping problem in large quarries. Small operators probably could not employ such equipment profitably, but where 250 tons or more of rock are quarried per day, there is no evident reason why a washing and screening equipment could not be employed with profit. Most operators will admit that with present high wages the steam shovel is far more efficient than hand methods for loading either rock or soil. The great weakness of the steam shovel is its inability to sort the materials that it loads, and hand methods are employed because it is necessary to sort the stone according to size, and to separate it from the clay. The washing and screening equipment accomplishes the necessary sizing and purification of the rock, and thus permits steam shovel loading. Where a heavy overburden is encountered, the bulk of the material may be stripped separately as a preliminary

operation, but all clay that occurs in close association with the rock may be separated in the washing plant.

At one lime plant in Pennsylvania the rock is all loaded with steam shovels, passed through a jaw crusher with an 8-inch opening, and carried in a pan conveyor to a rotary screen. The larger sizes are conveyed to the kilns, and the smaller sizes to railroad cars for flux or road work. With the addition of nozzles and other necessary equipment to wash the stone during its passage through the rotary screen, this type of plant would be ideal for rock mixed with clay as in the valley region. It would also prepare the way for better utilization of the smaller sizes of stone, materials which are now mostly mixed with soil and thrown away as waste.

Occasionally clay-filled cavities of large size are encountered. In one quarry in Virginia a mass of clay 60 feet across reached to the bottom of an 80-foot excavation. On account of the slow hand methods employed, its removal seriously curtailed the output of the plant for two years. Obviously it would have been easy for a steam shovel, operating on the quarry floor, to remove such a mass in a few weeks.

Deep erosion cavities often occur in places where it is difficult or impossible to employ ordinary mechanical methods of removal. Several instances have been observed where a succession of laborers shovel the clay from bench to bench until it is finally thrown to a point from which it can be loaded into cars or dump carts. Such methods date back to antiquity, and involve a labor charge that is prohibitive under modern wage conditions. If a clam-shell bucket, drag-line excavator, or similar device cannot be employed, it is suggested that the soil be mechanically elevated by means of some type of wagon-loading equipment now so generally used. A portable belt or bucket elevator is

easily placed in position, and may be operated at low cost by electric motor or gasoline engine. With such simple equipment two men could easily do the work of 6 or 7.

One operator has solved the stripping problem simply and effectively by removing the lower ledges of high grade lime stones without disturbing the overlying inferior rock and clay. From the quarry wall an entry is driven into the ledge, and drifts are projected right and left. Certain disadvantages are connected with mining limestone, and the method is to be recommended only where a sound roof is obtainable, and where an excessive thickness of soil or waste rock overburden is encountered.

As a result of his observations the writer concludes that removal of the overburden is unusually difficult in limestone quarries in the Shenandoah Valley, and that stripping expense is consequently one of the chief items of quarry cost. It would be very helpful to the Bureau to obtain from operators who have the data definite figures showing the proportion stripping costs bear to total quarry cost.

The writer is convinced that if mechanical means of removing the overburden were more generally employed the stripping expense would be greatly reduced. Stripping costs in the Valley by hand methods vary from 20 to 45 cents per cubic yard for average conditions and are very much higher where clay removal is exceptionally difficult. The cost of hydraulic stripping varies from 3 to 11 cents per cubic yard while steam shovel operation costs from 16 to 30 cents per cubic yard.

A decision as to the best methods and types of equipment to be used in stripping is open for discussion, and it is hoped that many operators will act upon the suggestion that they submit their ideas to the Bureau of Mines.



## Cars for Pits and Quarries

THE writer recently visited some quarries where he found one-horse dump carts in use for hauling stone from the ledge to the crusher. More recently he saw a photograph taken in a large quarry of a steam shovel loading blasted rock into a one-horse dump cart.

There is no more expensive way of hauling rock than with a dump cart. Yet it seems that it is still done in many sections of the country. The methods of transporting materials in pits and quarries has changed to such a great extent that it has been difficult to keep abreast of the times. This has been due partially to the change in the method of loading material at the ledge and in the pit, and to the fact that there has been a vast improvement in the kinds and designs of vehicles that have been used. This means that it is now possible to use such vehicles and machines as will easily increase the production and at the same time reduce the cost.

It must be realized in operating crushers, that in most cases the capacity, both rated and actual, is generally much greater than is usually produced in a day. Thus if by means of the type of vehicle used to transport the rock to the crusher, the output is materially increased, the investment in the vehicles and other transportation plant is quickly paid for out of the increased earnings.

It is a wrong principle to be satisfied with the plant one has on hand and in operation, when there is on the market a better type of machine that will assist in increasing the earnings. This is the secret of success in operating quarries and pits.

The type of vehicle used must depend upon the method of loading the vehicle. It is manifestly wrong to have a high type of car or vehicle if loading is done by hand and to use a low one when steam shovels are

used, yet strange to say this is done in many cases. In one quarry the writer visited he found six-yard contractor's two-way dump carts, nearly 5 feet high, being used. Men were loading these by hand, and naturally all stone had to be broken to such a size that could be thrown into the car, the stone being much smaller than necessary to go into the crusher. This means an extra cost for breaking. The cost of loading was bound to be excessive as men do the least work in raising material vertically by hand or with a shovel. A low type of car should have been used in this quarry.

In another quarry the same type of cars were being used, but instead of loading them directly by hand, one-horse dump carts were loaded by the men and the carts were hauled up an inclined runway onto a platform, from which the stone was dumped from the cart into the cars. This allowed of larger stones being loaded, and saved some sledging, but it was expensive loading and hauling and meant that all the material had to be re-handled. In both of these cases a low type of quarry car should have been used.

In contrast to this, in another large quarry, a low type of car, meant for hand loading, was being used, in spite of the fact that a steam shovel was being used to do the loading at the ledge. The reason for this was that these cars dumped from a tippie and so as to continue the use of the tippie the same type of car was used, although it meant much waste time for the shovel. Part of the dipper load was wasted on each side of the car and the dipper had to be lowered so as to prevent breaking the car when the rock fell into it. The fact that the cars were small, meant frequent waits for the shovel to move and place cars.

This case shows the fallacy of keeping the old equipment. The type of car used was ideal for hand loading,

and a tippie was necessary to dump this type of car, but when the steam shovel was installed then it was necessary to install a new type of car and with them change the method of dumping.

Loading and dumping should govern the type of car to be used. If hand loading is done, the lowest type of car obtainable should be used, while for machine loading a higher type can be used, and also one of larger capacity; yet the size of the car in quarries must depend somewhat upon the size and mouth of the crusher, while with sand and gravel, the screening or washing plant will help to govern the size.

The dumping of the car is important, but in most cases this can be changed to suit the other conditions, but it is evident that a side dump car cannot be used on a tippie. There should be no trouble, though, to change the tracks in most cases so as to do away with a tippie and make it possible to side dump.

A decade or two ago the only choice that an operator had in vehicles was that of using a one-horse dump cart or cars. In those days there was little machinery used to load vehicles, as most of this was done by hand, consequently the vehicles were small. In these days it was not such a bad proposition to use the carts, but even small cars were much cheaper, as these carry a much larger load and the cost of hauling them is less than that of carts. Then too, one horse can operate two or more cars, while it takes a horse for each cart.

With the coming of the patented or drop-bottom dump wagons, some of these were used in quarries and sand and gravel pits, but they never came into extensive use, due to the fact that it was not an easy matter to drive the wagon over a crusher opening or a chute. Thus the load had to be dumped to one side and rehandled.

For hand loading, wagons, too, are high as compared to the low type of quarry cars, hence this prevented their use a decade or two ago.

With the coming of the steam shovel for loading in pits and quarries, the wagon was not used extensively, as auto trucks likewise came into use about the same time, so that when loading was done to make final deliveries the truck, for long hauls and for its much larger load, was preferred over the wagon.

This was the first use of trucks for pit and quarry operation. Today the truck is being used to some extent for hauling material from the pit or quarry to the plant. This use is gradually growing and is likely to become general.

It is a more flexible hauling unit and saves the laying and maintenance of a system of tracks and for small operations it should be cheaper than cars, but the load is never likely to exceed 6 or 7 tons with one truck or about 12 tons using a trailer. This means a man for this tonnage, while for larger operations it is possible with a gasoline motor or an electric locomotive, and one or two men, to haul 20 to 100 tons a trip. This means a less cost for hauling, while the loading machinery will lose less time, reducing that cost, while the plant should show a greater production, thus reducing that cost and giving more product to sell.

Cars will never be entirely supplanted in pit and quarry operation, and in most cases will prove to be the cheapest vehicle for transporting materials. In some individual cases, other types of vehicles may be better adapted to the local conditions.

Thus every operator should have the most intimate knowledge of all types and kinds of cars that are suitable for his work and know that he is using the kind of car that will mean the largest output for the least cost.



## The Use of Shovels

**A**LTHOUGH in pit and quarry operations, machines are rapidly taking the place of hand shovels in handling most materials, yet there will always be some use of men with shovels to do certain work.

Wherever possible hand shoveling should be eliminated, for it is both a slow and expensive method of handling material, more especially stone. But if hand shovels are to be used then they should be handled properly. It is quite surprising how many men who use shovels have little idea of the proper way to handle them. Like a pick or sledge they seem to think that any way, so they do their work, is all right, little realizing that to use any tool in an improper fashion means to make them awkward, and cause them to put forth much effort and energy, yet accomplish but little work.

Only a few days ago the writer stood watching two men rehandling dirt from a deep hole. Both were using long handle shovels. The writer timed each. One man working about as continuously as the other, shoveled twelve shovelfuls in a minute, while the other handled about eight and a half, or seventeen in two minutes. The load on each shovel was about the same. The timing was kept up for about ten minutes, so that a fair average was obtained. Upon questioning the men it was found that the one throwing twelve in a minute had done laboring work, using a shovel most of the time for a period of about twenty years, while the one throwing but eight and a half had done similar work for about twenty-five years. Both men are between forty-five and fifty years of age.

Here were two men who should both have been experts, yet one was a good shoveler, using nearly the correct motions, while the other was an indifferent shoveler due to the fact that in spite of his long experience he did

not know the correct motions of shoveling. One was doing his work mostly with his back while the other was depending almost entirely upon his arms.

The difference meant fatigue for the one, while the employer was obtaining forty per cent more work from one man than from the other.

Some will say that this is the idea of a theorist, and that men differ so in physical strength and the dexterity of their movements that it is possible to find men who will do twice as much work as others. This is true, for men differ much in their strength and dexterity; but it has been proven in many cases that men can be taught how to work and so trained as to be as expert in shoveling as those to whom the art of shoveling seem to come naturally.

One example of this occurred only a short time ago. The writer had a man in his employ who was a wonderful expert with a shovel. Long years of work had made his muscles like steel, and he knew the exact motions that gave him rapidity without tiring himself. He, like the writer, knew that men could be taught how to use tools, for many years before a fellow laborer had taught him how to shovel. The result was the writer put him to work to train some perfectly green men.

One in particular was a boy about twenty-one years of age, discharged from the army as both mentally and physically unfit for the service.

This boy could not shovel more than two or three cubic yards in a day. He was first taught the motions with his back, then those with the legs and knees, and last the arm motions. When he got out of these motions he was stopped and told to set himself and start fresh. The result was that within a week or ten days he had learned enough about shoveling to handle about seven cubic yards in a

day, and to his great delight he was not tired and soon came to enjoy his work.

Each week he showed marked improvement, doing more work with less fatigue. After six weeks of training he was put to work with the expert on a job where he had to go and come with each shovelful with the expert, and to everyone's surprise, including his own, he was able to cast eighteen cubic yards of sand in a ten hour day. The novice had become an expert shoveler and he found he was not used up as much with his work as he had been previously when he was moving only a few yards of dirt. His muscles had become trained and hardened to the work. This man had never used a shovel before, as he had been an east side bum in New York city, living by petty thieving. When he attempted to earn a living with a shovel he had been promptly discharged as incompetent.

This is only one of a number of striking examples of how men have been trained to use tools properly. There can be no doubt that it pays to train men.

To do this, though, the proper kinds of tools must first be placed in the men's hands and those who are to do the training and teaching must themselves know the proper use of the tools, and the motions that are needed.

It is a singular fact that most workmen who have not been trained properly, make too many rather than too few motions in handling tools. This is true even of as small a tool as a monkey wrench, or a trowel in the hands of a bricklayer. With larger tools it is likely to be more so, with the result that men quickly fatigue themselves, and must have more rest spells than when they have eliminated the superfluous motions.

Men in performing physical labor must take certain rest spells, and the periods of rest have much to do in

cutting down the amount of work done in a day. For instance, a man knowing how to handle a shovel is not likely to spell himself during a minute more than ten seconds, and he can learn to do with about ten or twelve seconds in a period of two and one-half minutes, while the man who does not know how to shovel and is using extra motions will spell himself every half minute, and his periods of rest are likely to be nearly as long and possibly longer than his working periods. Men should never be scolded for taking a reasonable rest spell, but it is the business of the employer and his foremen to so handle their men that the men will not need excessive periods of rest, and if the workmen are trained to handle their tools properly the rest spell will be less frequent and of reasonable length.

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The Niagara Stone Products Co., Bellefontaine, Ohio, has been incorporated for \$200,000. The officers of this company are, K. C. Flickinger, secretary-treasurer, C. W. Hert, President and D. A. Frampton, vice-president.

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The Saticoy Rock Co., Ventura, Calif., has been incorporated with a capital of \$150,000. Incorporators: A. G. Wright of Fullerton, C. A. Beall of Los Angeles, A. H. Stovall of Santa Paula and Charlotte Stephens and D. G. Bowker of Ventura.

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The Oolitic Limestone Co., Indianapolis, Ind., has been incorporated with a capital of \$1,000,000. The directors of the company are E. C. Shiremen, James Gin and Everett Lowden of Martinsville, Ind. The offices of the company are in the Indiana Trust Company Building, at Indianapolis.

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The Phoenix Stone Co., Manhattan, N. Y., has been incorporated with a capital of \$50,000. Directors: T. F. Conlon, R. W. Owens, Jr., J. J. McGinty. Attorneys: Van Doren, Conklin, McNevin and McClenthen, 31 Nassau St., New York City.



## Sand and Gravel for New Minnesota Highways

THE Guaranteed Gravel & Sand Company of Mankato, Minn., has for the last year been successfully operating a new gravel plant a few miles out of Mankato close by the works of the Carney Cement Company. This promising concern which, under the direction of J. G. Emery, president, has already established itself in the district it serves, is operating on funds raised in the locality. The business is incorporated for \$50,000, all of which is paid in.

The firm was known at the time of its incorporation as the River Sand & Gravel Company. The choice of name was due to the fact that the gravel is excavated from a bank of the Blue Earth River. This name, however, was changed to the present title of the concern in deference to the River Sand & Gravel Company of Winona, Minn., who dredge sand and gravel from the Mississippi River.

The deposit of sand and gravel which the company is working covers about 18 acres. It underlies from 6 to 8 inches of overburden and runs to a depth of 65 feet. It is singularly free from chalk, slate, silt, clay and any organic impurities, which would make it undesirable as an aggregate for high class concrete work. The material runs 50 per cent sand. Half of this is suitable for a plastering sand. The chief materials that the owners intend to produce is gravel for roofing. For pebble dash, a size running from pebble dash to 1 inch and a size from 1 inch to 2½ inches. It is the intention to put in later a small crusher for reducing oversize, if enough of this material to pay for the installation of the crusher is encountered.

The plant is located on what was a bank of the old bed of the Blue Earth River. The cableway extends across this original river bed and over a

gravel bank covered with brush, poplars and willows, reaching into a clear gravel deposit, after which comes the Blue Earth River, a comparatively small stream of water. To reach the material it was necessary, in the first place to clear the gravel bank of vegetation and to strip off the overburden. As this work was carried forward and overburden and material excavated, a pond was formed by seepage from the Blue Earth River. This proximity of the river to the plant guarantees, of course, a supply of water for the washing operation.

The material is excavated by a Sauerman dragline outfit, operating from a 90 foot mast with a one yard dump bucket over an 800 foot span. The system is operated from a hoist made by the American Hoist & Derrick Company of St. Paul, Minn., powered by an 80 horsepower engine, also the product of that concern.

Work on the erection of the plant began in April, 1921, and was not completed until about December 1st of that year. As it was too late for washing the gravel, the company began the production of pit run material and continued so to operate throughout the winter. This activity got the deposit in good condition for working in the springtime. One of the photographs here included shows the bucket operating in earth on which snow has fallen. As the winters in this section are quite severe the work between the time the plant was erected and the time spring weather began was in many cases done under great difficulties. Particularly did the matter of lubrication present a serious problem. It was hard to keep the blocks and sheaves free enough for operation. The grease kept congealing regularly, and it was only after a number of lubrication experts had visited the plant



The Plant Operated All Through a Minnesota Winter

and had worked out their problem that satisfactory results were secured.

When the spring season began the company put in operation its washing system. At present the material is dumped from the cableway bucket into a hopper above the screens. Between this point and the screens it passes a grizzly, which knocks out oversize materials, and then passes through a system of Dull inclined conical screens equipped with a condenser. Water for the washing operation is supplied by a Swaby 2½ inch centrifugal pump, which throws 300 gallons of water per minute. This water enters the system at the point where the sand enters the screens. The screens are powered by a 10 horsepower crude oil "Y" engine manufactured by the Fairbanks-Morse Company, and the pump by another engine of identically the same description.

The plant has a capacity of about 400 yards of washed and screened product each 10 hour working day. There is plenty of work to do there, for some of the very best road jobs in the state are under way in the vicinity.

Most of the material produced by the plant is shipped by railroad, but

a considerable truck business is also handled. Cars are loaded at one side of the plant and trucks at the other.

## McGraths Capitalize at Half Million

Increase of its capitalization to a half million dollars, and building of an additional plant at Joliet, Ill., is announced by the McGrath Sand and Gravel Company of this city, incident to the filing of new articles of incorporation with the secretary of state. The company was formerly incorporated for \$100,000. With erection of the plant at Joliet the company will have five plants in Central Illinois.

The plant at Joliet is being built on the Gauger land, to which the company has taken title, along the Michigan central railway, at the east side of town. Construction will continue throughout the winter, for completion by March first. Approximately one mile of track already has been laid to serve the plant.

The McGrath Sand and Gravel company's success in this line of endeavor has been marked. Around a nucleus of three brothers, J. W. McGrath, T. E. McGrath and T. P. McGrath, the company, starting fifteen years ago, has developed from one small plant with a capacity of one car per day, to five plants, shipping 150 cars per day. The other four plants are located at Mackinaw, Pekin, Chillicothe and Forreston, Ill. The company maintains its general offices at Lincoln.

The Joliet plant is being constructed to produce forty cars per day. Two immense crushers are being erected for reducing the boulders to commercial sizes. The company will produce material for state road work, railroad ballast and all commercial uses.

It is perhaps remarkable among commercial affairs when three brothers of the same family organize and develop a business with the evident success that this concern has had. J. W. McGrath supervises the construction and operation of the various plants. T. E. McGrath has charge of traffic and selling, and T. P. McGrath accounting and credit.

The company maintains sales agencies in Bloomington, Springfield, Freeport, Galesburg and Joliet. The stock is practically all owned in Lincoln.—Lincoln, (Ill.) Evening Courier.



# Phoenix Gypsum Company Grinds Raw Rock

**A**T Oakfield, New York, on the West Shore Railroad, is located the mine and crushing plant of the Phoenix Gypsum Company. Operations at this plant were begun in December, 1920 and have been continued on a fairly extensive scale ever since. The purpose of the plant is to produce raw crushed gypsum. No calcined material is produced, but the company will later produce an extensive line of calcined material at a new plant which will be located near Akron, not a great distance from the Oakfield workings. The operations, present and projected, in the Akron district are known as those of the American Gypsum Co., with which the Phoenix Gypsum Company is associated and with which it maintains offices in common in Rochester, New York, under the management of Mr. Harry C. Nobles, president. The plant and mill of the Phoenix Gypsum Company at Oakfield, as well as the operations of the American Gypsum Company around Akron, are in charge of Mr. L. E. Chamberlain, superintendent.

At the Oakfield workings there is a 4 foot seam which the company is now working in four places from a main haulageway running in about  $\frac{1}{4}$ -mile from the bottom of a vertical shaft. Under these conditions the company is pushing the work into a good deposit of gypsum.

The Oakfield district now produces more gypsum than any other section of the state. Located close to the Phoenix plant, along the West Shore Line, are the plants of the Niagara Gypsum Company and the large plant of the United States Gypsum Company. The stone throughout the district is very suitable for calcination, is white in color and yields nearly white plaster. An analysis of material from two

of the mines in Genesee County, in the same deposit which the Phoenix Company is working, show a chemical constitution as follows:

|                                      |       |        |
|--------------------------------------|-------|--------|
| SiO <sub>2</sub> .....               | 1.03  | 0.40   |
| Al <sub>2</sub> O <sub>3</sub> ..... | .41   | 2.97   |
| Fe <sub>2</sub> O <sub>3</sub> ..... | 1.27  | .77    |
| CaO .....                            | 30.74 | 30.76  |
| MgO .....                            | 2.01  | 1.53   |
| SO <sub>3</sub> .....                | 42.39 | 43.78  |
| CO <sub>2</sub> .....                | 2.20  | 2.80   |
| H <sub>2</sub> O .....               | 18.19 | 17.53  |
|                                      | <hr/> | <hr/>  |
|                                      | 98.24 | 100.54 |

Gypsum calculated .. 91.27 94.26

As stated above, the entire output of the Phoenix Gypsum Company is crushed raw gypsum. This is used chiefly by manufacturers of Portland cement. The tendency of freshly made Portland cement to set so quickly that it cannot be handled with convenience is well known, and the capacity of gypsum, raw or calcined, for retarding this set is equally well known. Many cements contain as high as 3 per cent of gypsum by mass. The gypsum is added at the Portland cement plants, just before the final grinding, so that it can be thoroughly mixed, without being put through an extra operation. Raw or calcined gypsum produces the same effect, but the calcined material is not nearly so much in demand with cement manufacturers as the raw gypsum. About 80 per cent of all the material that goes to Portland cement plants for use as retarder is raw gypsum.

Material is secured at the working places by the process usually employed throughout the New York gypsum fields. Drill runners are kept working during the day time with Scranton electric rock drills, drilling holes for the charges of dynamite which are set off each night. These blasts bring down considerable quantities of material for

loading into mine cars during the mining period. Material that is shot down is reduced to one-man size by sledging or by the use of jackhammers.

When the stone is reduced to suitable size for handling it is loaded by contract workers into 2-ton mine cars. These cars are picked up and made into trains at the haulageway, along which they are drawn by a Plymouth gasoline locomotive. This piece of equipment is used because it is possible to keep the mine well ventilated and the fumes of the gasoline engine do not cause any inconvenience to the workers.

The mine is drained by two Taber centrifugal pumps with 4-inch intake and 5-inch discharge lines.

Trains of 2-ton mine cars loaded with gypsum are drawn to the foot of the vertical shaft which extends above ground level to the head frame at the top of the mill building. At the top of this head frame the car of gypsum opens a door and discharges the contents by dumping forward. The elevation of material up this shaft is on the balanced car principle, a car of gypsum being drawn up while an empty car is descending, thus using power only for the elevation of the gypsum itself. A single drum Flory hoist is used for the operation of cars in this head frame. The hoist is geared to a General Electric motor.

It may be well to mention at this point that, except for the gasoline locomotive in the mine, electric power is used exclusively, Niagara River current is received at 11,000 volts and transformed to 440 volts. An amount of current is regenerated by a General Electric rotary converter, the direct current being required for the drills in the mine and for an electric trolley locomotive system, which the company expects to install when the mining operations have been put on a more extensive basis.

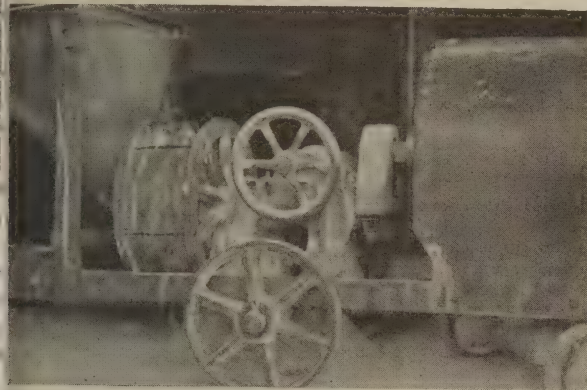
Cars of gypsum are dumped from the top of the head frame over into a hopper above a Jeffrey hammer mill which reduces it to an average of half an inch. In connection with the hopper, from which the hammer mill is fed is an automatic weighing device built around a scale manufactured by the Buffalo Scale Company. This device weighs cars of material as they go from the mine.

The product of the hammer mill is picked up without previous screening by a screw conveyor 8 feet in length, which passes the stone to a chain bucket elevator 40 feet between centers running to loading bins for passing directly to cars.

The crushed gypsum may be sent to the storage bins instead of the car-loading bins mentioned above. The method of accomplishing this loading of storage bins is quite efficient. The elevator, at such times as it is desired to pass stone into storage bins, is made to discharge by the setting of a flop-gate on the short belt running to the center of the conveyor belt which passes over all bins. The motor from which this conveyor belt is driven is operated from a double throw switch which permits the running of the motor in either direction. Thus the belt may be made to travel in a right hand or left hand direction from the end of the short loading belt. Scrapers arranged at intervals on the conveyor belt make it possible to drop the material at any bin desired. This method is working out very satisfactorily, and appears to be a quite efficient way of loading solid material into any one of a series of bins arranged in a straight line, when there is not sufficient headroom to arrange chutes to each of these bins, and where it is not desired to raise the material to a sufficient height to permit the use of separate chutes to each bin.

A considerable part of the material produced at this mine is loaded into





Box Cars are Filled by a Fairmont Loader

box cars. This operation is taken care of by a car loader manufactured by the Fairmount Mining Machinery Company of Fairmont, Virginia. This device, shown in one of the accompanying photographs, takes in material through a hopper at one end, and throws it sideways towards both ends of the cars until the car is filled as far as the doors. The hopper end of the loader extends through the open door of the box car on the side near the plant and receives its supply of gypsum through a chute running from the bins.

## Two Valuable Volumes

Two new volumes of much interest to many operators in the pit and quarry industries have just been brought out by John Wiley & Sons, Inc., of New York.

One of these is entitled "Belt Conveyors and Belt Elevators," and is written by Frederick V. Hetzel, M. E., Member of the American Society of Mechanical Engineers. The author's purpose in writing this book was to make a very practical volume explaining principles and the reasons for doing things. Belt conveyors and belt elevators are so generally useful and suit so many kinds of materials, under so many operating conditions, that they are used to illustrate some of the principles underlying the general subject of the

reason and use of conveying and elevating machinery.

The book is divided into twenty-three chapters under such headings as: "Development of Belt Conveyors," "Belts and Belt Manufacture," "Driving a Belt," "Loading the Belt," "Special Uses of Belt Conveyors," "Centrifugal Discharge Elevators," "Continuous Bucket Elevators," "Elevator Boots," "Inclined Elevators," etc.

The book contains over 300 pages, with a complete index, and is

illustrated with nearly 300 figures. The price of the book is \$5.00.

The second volume to which reference has been made, is uniform with the above in size and style but runs to more than 600 pages and sells for \$6.50. It is a second edition of "Cements, Limes and Plasters," by Edwin C. Eckel, C. E., a well-known authority on this subject, and the first editor of whose work under this title has become a classic. In addition to numerous figures showing the installation of equipment in these plants, it contains maps showing the distribution of these materials.

The Holmes Sand & Gravel Co., Millersburg, Ohio, has been incorporated with a capital of \$100,000. C. O. Geib, P. H. Damon, W. F. Carver, J. W. Fenton and E. R. Defenbaugh.

Messrs. Elson and Rynee of San Francisco, Calif., are driving an adit to tap the subterranean gravel deposit under the Sledge Mine, at Confidence, Calif. Under their direction, the work is going ahead rapidly.

The plant of the San Bernardino Valley Lime and Rock Co., at Colton, Calif., which has been under construction for the last two years, has recently been put in operation. The lime deposit is located at Vertemont, and the rock is shipped to the kilns at Colton to be burned. Each kiln has a capacity of 150 to 200 barrels daily. The officers of the company are M. P. Bates, president; J. D. Baugh, manager; and J. W. Bates, secretary.

## Program Shaping Up

### National Crushed Stone Association Getting Ready for Chicago Convention

January 15, 16 and 17 are the dates for the convention of the National Crushed Stone Association at Chicago. The program committee is at work and expects to have a complete program whipped into shape at an early date. As at present arranged it is as follows:

#### MONDAY, JANUARY 15

10:00 A. M.

1. President's Address
2. Secretary and Treasurer's Report
3. Report of Research and other standing committees
4. Talk of representative of U. S. Department of Commerce or Interstate Commerce Commission on Transportation Situation
5. Talk on Transportation Situation from the point of view of the railroads by prominent railway executive

12:30 A. M.

Luncheon by Groups (separate rooms)  
Agricultural Limestone Producers  
Ballast Producers  
Concrete Aggregate Producers  
Granite Quarry Men  
Machinery, Equipment and Material Manufacturers

#### AFTERNOON SESSION

2:00 P. M.

1. Paper on "Information and Data That a Banker Wants to Know About a Quarry Operation Before He Will Help Finance It." By a prominent Chicago banker
2. Paper on "Valuation of Stone Deposits Including Exploration of Quarry Property Geological Data, Exploration Possibilities, etc." Designed to bring out the factors in a stone deposit which make it worth developing as a crushed stone property; and to furnish some basis for a reasonable valuation of undeveloped quarry property, taking into account a study of markets and commercial possibilities as well as the geology, quality of stone, etc.
3. Full and complete discussion from the floor of subjects 1 and 2 above

#### TUESDAY, JANUARY 16

10:00 A. M.

The entire day to be devoted to full and complete discussion of "Quarry Operation" under the following heads:

1. Stripping
2. Drilling and Blasting
3. Handling Stone in Quarry
4. Quarry Transportation
5. Primary Breakers
6. Secondary Breakers
7. Screening and Sizing
8. Storage and Shipping

Each one of these subjects will be handled by a paper contributed by some

one who has had special experience in that particular subject or who is particularly well posted on the field as a whole. The discussion of each subject is to be led by two or three others who have come prepared to discuss the paper presented. It is the intention to have the original paper on each one of these eight subjects placed in the hands of the chairman of the program committee at least three weeks prior to the convention. These papers will be edited, printed and distributed to each and every member, if possible, several days prior to the convention, so that the time of the convention can be devoted largely to a free-for-all discussion of these subjects, the papers being read merely by title or in the form of a brief synopsis.

#### TUESDAY LUNCHEON

12:30 A. M.

Luncheon by Territorial Groups, Eastern, Central, Southern and Western

2:00 P. M.

Continuation of morning program

7:00 P. M.

Annual Dinner. Addresses by William H. Finley, President of the Chicago & North-Western Railway; C. E. Spens, vice-president of the Burlington Railroad and at present federal fuel administrator, and others.

#### WEDNESDAY, JANUARY 17

10:00 A. M.

Discussion of Quarry Management

1. Cost Accounting Methods
2. Overhead, Depletion, Depreciation, Insurance, etc.
3. Cost Experience—Summaries of Cost

These subjects will be covered by a general paper contributed by one or more operators, and will be fully discussed on the floor at the convention

11:00 A. M.

Merchandising Quarry Products

1. Sales Organization
2. Sales through Dealers—Allowance for commission, etc.
3. Prices and Discounts
4. Effect of Car Shortage and Traffic Uncertainties, etc.

12:30 P. M.

Luncheon

General get-together, wind-up Luncheon

#### WEDNESDAY AFTERNOON

2:00 P. M.

Discussion of Uses of Crushed Stone, Road Stone and Concrete Aggregates—paper by representative of the U. S. Bureau of Standards and prominent highway engineers

2. Railway Ballast—Paper or talk by representative of the American Railway Engineering Association Committee on Railway Ballast
3. Fluxing Stone—Paper or talk by prominent Iron or Steel Chemist on kinds of fluxing stone and their particular uses
4. Agricultural Limestone—Paper or talk by Agricultural Experiment Station man or some prominent user of agricultural limestone
5. Special Uses of Crushed Stone—Paper by prominent operators on various minor uses of crushed stone, such as chicken grits, patent roofing, pebble dash, etc.

Election of Officers



# Frank Farrington's Business Talks

## *No. 9—Can You Sell Yourself?*

You offer yourself for sale.

In other words, you want somebody to buy your services, your time, your energy, your efforts.

If you have a position now, a pretty good position, you may think you have made the sale and need worry no longer.

In operating a store would it be good business to make no effort to hold the trade of the individual already a steady customer?

The merchant making no such effort would lose his best customers.

You should work to keep your employer sold on your usefulness so you can hold your position, and also so you can get a larger salary.

The probabilities are that the best prospective purchaser of your services is he who has already secured them and knows whether they are satisfactory.

If you can give your present customer satisfaction, making him like your services, you should be able to make your services valuable enough so he will pay a gradually increasing wage for them.

In order to get more money for your services, you must earn more.

You must be worth more before you get it, because an employer is not foolish enough to pay you in advance for what he hopes you are going to do.

Some men reason that because they have held a position for so many months or for so many years they deserve an increase in salary.

You and I know that the concern that would increase its employes' salaries for no other reason than that they had been with it for so many moons, would soon find itself losing money on them.

In order to get more money for yourself, you must make more for the boss.

So, selling yourself is a matter of proving your earning power.

When you sell yourself to a man the first time, you have to show him, convince him that if he gives you the chance, you can earn money for him.

In order to sell yourself again and hold your position or get a raise, you must actually earn more money for him.

And that is all there is to selling yourself, just as it is all there is to selling merchandise—just show the other fellow he will profit by buying.

## Profit in Sand for Polishing

By ALFRED B. SEARLE, Consulting Technologist.

WITH a little salesmanship a profitable side-line for many owners of sand pits is in the production of a sand to be used as a polishing agent. This profit may be gained in several ways, but only two will be mentioned in this article: the first in connection with polishing decorative stones, marble and glass, and the second for polishing metals.

Many stones are of small value until they are polished, but the small amount expended in this treatment greatly increases the prices at which they can be sold. Yet the polishing—to yield a good return—must be done with a material which can be relied upon to the utmost, even in the hands of semi-skilled workers. In days gone by the men employed as polishers bought any kind of sand or stone they fancied and treated it laboriously in order to remove the objectionable materials in it. They worked on small quantities and without proper appliances, but labor was cheap and little was known about the underlying principles involved either in polishing or in preparing the polishing materials. Nowadays labor is too dear for old methods to be continued, and it is precisely for that reason that owners of sand quarries can increase their profits with a little ingenuity and some selling ability.

### The Requirements

In order to produce a high polish on any kind of stone or similar material, the surface must be made increasingly smooth by rubbing it with a series of materials each of which is finer than the preceding one. The first treatment may sometimes be done with a planing machine or even with a saw, which gives a fairly flat surface. This surface has then to be made smoother and ever smoother by

rubbing. A hard coarse polishing agent will do quite well for the roughest work, but if it is applied near the end of the polishing it will make deep scratches which cannot be eradicated without commencing the polishing all over again.

No single grade of material can be used all through the polishing; a series of grades, each carefully adjusted to the work it has to do, is absolutely necessary for the best and most rapid work. Many materials may be used for this work, but sand is cheap and very effective if properly prepared and its use offers the best return to the makers of polishing agents.

### Where Are the Sands?

Sands which can be made suitable for polishing, occur naturally both in loose grains, and in a compact mass as sandstones. These sandstones which occur in large masses in many parts of the world and are composed of grains of quartz firmly united with a bond of amorphous silica, can be crushed and then form a sand which is particularly useful for converting into a polishing agent, provided the grains in the stone are of the right kinds. The stone must be sufficiently pure; this can be judged by the lightness of its color and even more accurately by the appearance of the individual grains when viewed through a lens magnifying about 12 diameters or through a microscope. For polishing purposes the sandstone is crushed to powder and so forms a sand, the degree of fineness varying according to the size of the grains which formed the sandstone and to the extent of the grinding. Some sandstones are sawn roughly to shape and are then rubbed on a carborundum wheel so as to give them a moderately smooth face. They are then sold for use as rubbing



stones for effecting a smoothing or preliminary polishing of various materials. The objection to most sandstones is that the bonding agent which unites the particles of silica in the stone makes the stone too hard to be used for polishing purposes. When such stones, or preferably those with a softer bond, are crushed and the dust removed they are similar in character to natural sands.

It does not matter in the least to the polisher whether he uses a crushed sandstone or natural sand, but to the owner of a quarry yielding broken sandstone, the production of an artificial sand offers a further source of profit.

Briefly, then, wherever there is a sand or crushed sandstone which possesses the properties mentioned later, such material is a potential source of polishing sand.

### Selecting the Sand

As only sands which consist of sharp grains of pure silica can be used for polishing, quartz is practically the only form of sand used for this purpose. In selecting the sand or sandstone care should be taken, to choose one composed of as nearly pure quartz as possible, for all the other materials which occur in sand are much softer than quartz. They tend to smear instead of polish and also interfere with the action of the quartz. In many cases the impurities can be removed but it is better to start with as pure a sand as possible.

Chemical analysis is sometimes useful, but it may result in a sand being condemned which is a really good polishing agent. The reason is that a chemical analysis reveals all the impurities whereas those which are entirely enclosed within quartz crystals do so little harm that they may be disregarded. Consequently,

a good microscopic examination accompanied by a test to separate (a) the clay and silt, and (b) the heavy minerals, is a far better guide to the suitability of the material. Moreover, these are well within the scope of the average superintendent whereas an elaborate chemical analysis is quite another matter.

Quartz, which is one form of silica, is one of the commonest and most widely distributed minerals, and is by far the largest constituent of most sands. It has well-defined crystals which have no marked cleavage, but break with a conchoidal fracture. Its hardness is 7 on Moh's scale—that is to say it is a little harder than feldspar, and can be scratched by topaz—and it has a specific gravity of 2.64.

Sands for polishing must consist wholly of angular grains, which must be of as nearly uniform size as possible, or the surface of the article will be scratched. Highly colored sands are seldom of much use for polishing purposes, though if the color is merely due to stains in the crystals or to material which is readily removed by washing, the sand may be useful. For this reason, before discarding a sand it should be carefully examined under a microscope. By this means, the size and shape of the grains can be seen, and if the microscope has the necessary fittings, the various impurities present can be identified and their proportions determined. If a large proportion of impurities are present, the sand soon becomes useless as the grains of the impurity are usually softer than those of quartz, and wear away rapidly, coating the sharper grains with the material which has worn away and so preventing any further polishing.

If the grains of quartz are large they are useless for polishing purposes, and must be ground. If, however, the sand contains grains of various sizes it may be possible, by

screening, to separate those which are suitable for polishing purposes.

The methods of screening sand are so well known that they need not be described in detail. To be effective the screens should correspond to the sizes of the grains of sand, unless—as sometimes happens—a sand is composed of grains of all sizes, when it will probably suffice to use four screens of 50, 80, 100 and 200 mesh respectively. Such highly mixed sands are not so suitable for polishing as those consisting almost wholly of one size of grain or those from which such a “one-size sand” can be separated.

There are plenty of white sands in the States 90 per cent of the particles of which are of one size; these—after a simple screening—are excellent for polishing so far as that size of sand is concerned. Finer grades must be produced by grinding followed by a further screening. This is often costly if carried out on a small scale as some of the sands used for polishing must be in the form of “flour.”

For grinding sand, ball and tube mills are employed. These consist of a revolving drum containing the sand, and a large quantity of steel balls.

As the drum revolves, the balls are lifted and then fall, beating the sand into powder which is then removed and screened or graded. For the finest polishing agents the process of levigation is usually employed. In this, the powder is stirred violently with water, and is then either allowed to settle for a few minutes, after which the turbid liquid is poured off and allowed to settle for a further period, this being continued indefinitely as the various sized particles are collected in various vessels; or the abrasive suspended in water is allowed to flow slowly through a series of tanks, each one in the series being of greater diameter than the preceding one. By this means the rate of

flow of the liquid is reduced, and the particles of sand are deposited according to the rate of flow and to their respective sizes. The various residues are collected separately and dried, ready for use.

In some cases the finest particles are separated by a current of air. The sand is passed into a funnel through which a regulated current of air passes. The air carries off the finer particles and the coarser ones settle and pass out through trap doors.

Each grade is useful for a specific purpose and the skill of the salesman lies in finding a market for each, as it would not pay to separate a small proportion of one grade if the others could not be sold.

In order to secure repeat orders the grading must be accurate and constant. Variations in the grade are highly objectionable to polishers and a ready source of loss of sales.

### Uses of Sands

Sand is chiefly used for polishing glass, marble and other stones, but owing to the absence of properly graded materials, and the sale of sand of inferior hardness, there is a tendency to replace it by artificial substances, obtained in the manufacture of carborundum. These artificial abrasives are costly and for many purposes are no better than properly graded sand. Their great hardness is sometimes urged as a reason for the rapid rate at which they work, but even this apparent advantage is accompanied by several drawbacks which counterbalance it in many ways.

When selling sand as a polishing agent in competition with other materials it is important to see that the particles of sand are sharply angular. To insure this they should be ground dry and not with water which rounds the edges and makes the grains into miniature pebbles of very low abrasive power and therefore slow in creating



a polish. The necessity of having sharply angular grains is equally great for all purposes for which sand is used as a polishing agent, the different stages of polishing being secured by the size of the particles and not by their shape.

For polishing glass or small blocks of stone rotating or oscillating discs or tables are used. These are charged with sand and water at intervals and the material to be polished is held mechanically in such a position as to be pressed against the wet sand. For some purposes the positions are reversed and the stone or glass fastened to a stationary holder and is polished by an upper moving disc or rubber, the wet sand being between this and the surface to be polished.

To obtain an exceptionally high polish, sand cannot be used alone; it may most suitably be employed for all but the final polishing, which should preferably be effected by rouge or putty powder (tin oxide).

### Polishing Metals

Sand of extremely fine grain—usually produced by the dry grinding process, but occasionally by screening very fine natural sands such as the *Kiesel Kriede* of Central Germany—is largely used as the polishing agent in many of the liquids and pastes used for polishing metals. For this purpose the grains must be so small that they rub away the tarnish without leaving any scratches large enough to be visible to the naked eye; under a microscope the tiny scratches are easily visible. Though so minute—they must pass easily through a 200-mesh sieve—the particles must be sharply angular or they will roll over the metal without polishing it.

The other ingredients of the fluid or paste consist wholly of a medium or vehicle to carry the sand and a detergent or cleaning agent—such as paraffin or oxalic acid—which owes its cleaning power to its solvent action.

There is no need to give proportions here as they can be found in many books of workshop recipes.

Notwithstanding the smallness of the grains of sand used in polishing metals its action is that of the large grains and is of an abrasive nature, *i.e.*, they remove the projections from the rough surface and fill up any hollow portions in the material to be polished.

### Sand Paper and Cloth

Sand is also used in moderately large quantities for sand paper and sandcloth to which it is affixed by strong glue. The sand used for this purpose must be accurately graded and highly angular. For smoothing wood and leather, sand paper is often preferable to harder abrasives such as emery.

### Materials Resembling Sand

Many materials having some resemblance to sand are also used for polishing purposes. Some of them occur in close association with sand and might be thrown away by quarry owners who did not realize their value. Among the more important of these are:—Rottenstone, Tripoli powder, Kieselguhr, and several varieties of silt.

*Rottenstone* is a soft siliceous stone of a yellowish-grey or brownish color and a very fine texture. It consists of the siliceous skeletons left behind after the large masses of certain impure limestone rocks have been removed by solution in rain-water containing carbon dioxide. This dissolves only the calcium carbonate and leaves the insoluble siliceous matter behind as a soft stony deposit.

*Tripoli powder* is also composed of siliceous skeletons and is often nearly white in color. It usually contains about 80 per cent of silica, a small amount of alumina, and up to 8 per cent of iron.

*Kieselguhr* (infusorial earth) is a whitish powder consisting of the siliceous shells of microscopical plants

and is easily recognized by using the microscope.

*Silts* are usually too fine and consist of grains which are too rounded to be of much value as polishing agents. A few of them—easily recognized on a microscopic examination—are excellent for the production of rubbing blocks. For this purpose they may be mixed with just sufficient clay to bind the particles together and are then moulded into blocks or briquettes and burned at a dull red heat. The famous bath bricks used in England are of this character and are made of a muddy deposit carried up by the tidal River Parrot at Bridgewater, England, and deposited as mud-banks or slime.

#### Summary

Among the apparent waste of some sand quarries materials may often be found which are valuable polishing agents. Still more profitable are the grades of sand which can be sold for various polishing purposes. These sources of profit should not be overlooked, as is so often the case; on the contrary their exploitation will sometimes yield a far better return than the ordinary sand plant. Even on a small scale they prove a profitable adjunct to the large plant.

### Brownhoist Sales Manager

The Brown Hoisting Machinery Co. of Cleveland announces that their conveyor sales are now in charge of Mr. E. P. Sawhill, who has had nearly 30 years engineering and selling experience on this type of equipment.

The Brownhoist elevator and conveyor equipment includes a complete line of belt conveyors, chain conveyors, coal crushers, screens, apron conveyors, etc.

The Acme Limestone Company has been incorporated at Kansas City, Mo., with a capital of \$300,000.

### Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,431,987. Separator-screen. Herbert S. Simpson, Chicago, Ill.

1,432,738. Portable apparatus for elevating and screening coal and other unscreened material. Paul J. Alwart, Chicago, Ill.

1,433,485. Pulverizing mill. Daniel V. Sherban, Canton, Ohio.

1,434,065. Grab-bucket. Ephrem Prefontaine, Buffalo, N. Y.

1,434,600. Screen and other separator. George H. Fraser, Brooklyn, N. Y.

1,434,601. Bucket-cleaner. James O. French, Chicago, Ill., assignor to F. C. Austin Machinery Co., same place.

1,434,691. Screen or separator. George H. Fraser, Brooklyn, N. Y.

1,434,692. Separator or the like. George H. Fraser, Brooklyn, N. Y.

1,434,843. Pulverizing apparatus. Fred I. Raymond, Evanston, Ill., assignor to Raymond Brothers Impact Pulverizer Co., Chicago, Ill.

1,434,937. Excavator. Marion H. Watts, Portland, Ore.

1,435,109. Bucket-trip for steam excavators. David De Santo, New Rochelle, N. Y., assignor to Wilkes Casey Engineering & Contracting Co., same place.

1,435,137. Mining apparatus. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co.

A company, known as the Waldo County Agricultural Lime Co., has been formed at Belfast, Maine, to pulverize and market limestone for farm use. O. W. Ripley of Montville is president, A. L. Young, Lincolnville vice-president; Allen H. Miller, Lincolnville, secretary; and A. S. Heath, Belfast, treasurer.

The Superior Portland Cement Co. are planning the erection of a \$16,000 building at Concrete, Wash., to be used for offices and a laboratory for the company. The contract is signed by the Rounds-Clist Co., general contractors, Tacoma, Wash.



## Waste in Boiler Operation

THE high price and scarcity of coal have accentuated the need of knowing and preventing the waste attending the operation of boilers. Too many business men profess that they know little if anything about boilers and their operation, saying they don't wish to know as they leave such details of their engineer or firemen. As a rule the cost of operating a small boiler is at least ten dollars while larger ones can cost forty or fifty dollars per day while batteries of large boilers can cost hundreds of dollars per day to operate.

Many business men have spent much money to eliminate small waste in their office and bookkeeping and also in their other operations, while boilers are neglected, and what may once have been an excellent boiler plant when new has become a very inefficient one.

This is poor business. If steam power is to be used, then the first thing to have absolutely correct and efficient is the boiler plant, and every business man who owns and operates such a plant should know the details of operation. Lacking this information, they should post themselves. It is with the idea of presenting some facts that will lead to and prevent waste of fuel in operation that this article is written.

Unfortunately some of the inherent defects in a boiler setting come from the design and installation. It is only possible to change some of these things by having the boiler reset. This is an expensive job, but in some cases it would more than repay for the money expended.

In looking for wastes, the first consideration is the ash pan. This should be of sufficient depth to give plenty of air to the fire box and hold a reasonable amount of ashes. If the ash pan is not built to give sufficient draft

to the grate, then it should be deepened. This can be done by either building the bottom on an incline or else digging a pit in front of the boiler and extending this space back under the ash pan to the bridge wall.

If these things cannot be done, then it will be necessary to install a system of forced draft. Money is wasted in coal consumption by poor ash pans.

Next to the ash pan comes the grate, and it is a strange fact that the grate is the keynote of everything that spells efficiency for a boiler. A grate can partially overcome defects about a boiler. A poorly designed ash pan, a poor stack, a short arch, even defects in the boiler itself, and it is also true that a boiler can be equipped in the best manner possible yet with a poor grate there will still be a great waste of fuel and a poor evaporation of water. It is quite surprising how the efficiency of a boiler can be effected by substituting the best type of grates for those of poorer design.

In one case in the writer's experience with a fairly efficient boiler plant using a battery of these boilers, in spite of the fact that the ash pan was correct, the fire box without leaks, a good stack and the boilers kept clean, the change of grates allowed the owners to save a boiler, for with the new type of grates two boilers did more work than the three had ever done.

In another case where two Scotch boilers were being used one boiler was made to do the work that both had done by simply substituting a better type of grate for those that were in the boilers.

In a third case with a large water tube boiler, the change of a grate meant the saving of more than two tons of coal daily, yet with natural

draft, an overrating of the boiler of 133 per cent was obtained.

The essentials of a good grate are: First, it should be made of such metal and of such weight as not to burn out or become broken. Second, it should give sufficient air through the grate as to give perfect combustion. This means  $\text{CO}_2$  combustion instead of  $\text{CO}$ , and the majority of grates give most  $\text{CO}$  combustion, unless the slice bar is used continually. Third, the grate must be so constructed as to allow it to clean itself without opening the fire doors and without dumping unburned coal or partially consumed coke into the ash pan to be wasted. Fourth, for anthracite coal the grate must be so designed as to cut off the bottom of the fire bed, getting rid of the consumed coal (ashes) without disturbing the top of the fuel bed.

The size of the grate is of great importance. The area must be sufficient to give enough combustion to obtain the rated horsepower or any over rating or carry an overload on the boiler, but it should not be so large as to burn an excess amount of coal. Thus with some types of grates it is possible to cut the grate area down as much as one-fifth or one-fourth and yet obtain greater water evaporation with a pound of coal than with other types of grates.

This is a fact that engineers and owners frequently overlook in substituting an improved type of grate for older, obsolete types. They seem to think that they must have the same size grate as they have been using, little realizing that they are wasting 20 to 25 per cent of their coal.

The next consideration is the fire-box itself. The dead plate does not play a prominent part in combustion, except that it should not be excessively wide, as many firemen will allow coal to burn on it, nominally wasting

that amount. The dead plate, though should be of the indestructible type so as not to cause frequent repairs.

The fire-box should be of the same size as the grate. This means that the grate must come flush with the bridge wall, and the side walls must go up straight from the grate. The height of the fire-box is important. Too many boilers are set too low. One reason for this is that the boiler room roof is built too low, so that there is not sufficient room on top of the boiler for a man to go upon it to work if the boiler setting is made to the proper height. There should be enough height to the fire-box to allow the gases as they are generated to circulate above the fire bed and become well heated before they are carried back into the back combustion chamber and up among the tubes, also to hold the smoke temporarily while the carbon is being consumed.

The exact dimensions cannot be given as this must depend upon the size and type of boiler. A high fire-box means a little longer time is consumed to get the boiler steaming, but with the steam once started, it is maintained easier with less coal.

Another important factor in this is the bridge wall in the rear of the fire-box. This wall should be of ample height to prevent burning coal from falling over it into the back combustion chamber and to deflect the gases and smoke back over the fire bed, but it should not be so high as to prevent their easy flow into the back combustion chamber, otherwise an excessive amount of heat is thrown against the fire walls and arches, so that heat is lost and these things with the boiler front are quickly burned out.

If the smoke and gases are to be held longer it is advisable to build a brick baffle behind the bridge wall in the back combustion chamber.

(To be continued)



## Adopt New Constitution

### National Sand and Gravel Association Does Important Work at Chicago Meeting

On November 15, at Chicago, representative sand and gravel producers of the United States, members of the National Association of Sand & Gravel Producers, adopted the new constitution which changes the name to the National Sand & Gravel Association.

Provision is made for the functioning of the organization under the new constitution by a resolution which reads: "... changes made in the constitution shall become effective as soon as practicable but not later than the date of the next annual meeting; provided, however, that, until such changes can be carried into effect, the present constitution shall govern."

The high lights of the new document, points in which it differs from the old constitution, are those concerned with the methods of individual and district representation, the payment of dues, and the organization of the administrative machinery of the association.

It was decided that the annual assessment shall be due and payable in 12 equal monthly installments, and shall be computed on the production of the previous year.

The executive committee of the new association may accept as individual members the membership of any state or district association that the executive committee shall recognize as such. In the case of such admission of individual members in a body the local organization shall agree to underwrite the dues of its entire membership, collecting the money from the individual members and paying the same to the national, less a discount of twenty-five per cent.

Associate members are provided for in an amendment to the constitution which reads as follows: "Any individual, firm or corporation not a producer of mineral aggregate but interested in the association may become an associate member without voting privileges upon payment of \$50.00 per annum."

It was decided that a special meeting of the association or the board of directors may be called by the presi-

dent or by five members of the board of directors at any time, after due notice has been given and the purpose of the meeting stated. The president or three members of the executive committee can call special meetings of the executive committee at any time by complying with the same conditions.

The executive committee shall consist of four members of the board of directors chosen by the board from its own number, these four members sitting with the president, vice-president and secretary-treasurer. This executive committee shall actively conduct the affairs of the association.

Before a meeting the organization had prepared a map of the United States which indicated the tentative division of the country into 26 districts. Under the terms of the new constitution each of these districts is entitled to choose one director.

Luncheon on the day that the producers met was provided at the Blue Fountain Room at the La Salle Hotel by Mr. Bradley S. Carr of the American Manganese Steel Company. The meal was greatly enjoyed by Mr. Carr's guests.

Shortly before the meeting adjourned Mr. John Prince presented to ex-President V. O. Johnston a handsome gold watch and chain and a diamond-set knife. The present was a very fitting one, and expressed well the feelings of the association towards Mr. Johnston, who for a number of years has given unsparingly of his time and talents for the advancement of the organization.

After the regular session, the executive committee met to decide upon the time and place of the next annual convention, January 24, 25 and 26, were fixed upon as the dates on which the convention will run. The committee was unable to select a city and will put the question up to the membership. It appears that the choice will be either St. Louis or Washington.

Mr. Ed. C. Wilson, formerly connected with the U. S. Light & Heat Corp. and the Vapor Car Heating Co. with offices at Chicago, has been appointed western sales manager for the Ohio Locomotive Crane Co. of Bucyrus, Ohio, with offices in the Railway Exchange Building, Chicago.

## Pick Convention City By Ballot

### Vote Being Taken Among Sand and Gravel Producers— Other Washington News

By Our Washington Correspondent

Officers of the National Association of Sand and Gravel Producers are anxiously awaiting the membership vote on the question of where the annual convention is to be held in January. At the Chicago meeting recently the 24th, 25th and 26th were selected as the dates, but no decision was reached as to the city. Washington, St. Louis and Des Moines were the three cities presenting claims for the next convention. Consequently, as it was impossible to make a decision at the Chicago meeting, it was decided to take a membership vote. Ballots have been sent out by T. R. Barrows, executive secretary, but not a sufficient number have come in to give any idea as to which city is leading.

Ten thousand miles of Federal-aid highways were completed in the last fiscal year, bringing the total mileage to 19,308, says an announcement just made by the Bureau of Public Roads. The year's work constituted a new record. Texas leads in miles of completed Federal-aid roads with 1,733 miles, while Minnesota is second with 1,416. Texas also is first in mileage under construction with 1,408 miles, and Nebraska is second with 970 miles. Iowa is third with 945 miles. Texas and New York receive the largest allotments of Federal aid, which is distributed on the basis of population and mileage of State highways.

Aside from the Federal-State highway work the bureau of roads has completed 1,352 miles of road in the national forests, and there are under construction 617 miles, the whole to open up regions of great natural beauty. Based on available data, bureau officers state, the sum to be spent this year on highways will total \$742,000,000. The figure includes Federal-aid roads and projects built in addition by the States and smaller municipal units without the aid of Federal funds. More than 30 miles of bridges have been built under the Federal-aid highway program since 1916. One of

the largest of these bridges, that from Mandan to Bismarck, N. D. is more than 3½ miles long and cost \$1,428,000.

Highway building over the country is to be given additional impetus, as the result of assistance offered by the Federal government. The bureau of public roads has addressed a memorandum to the highway departments of all the State governments offering them thousands of tons of explosives which were left over from the war. Picric acid is being distributed in large quantities and road builders and highway engineers are urged to write to Washington to obtain allotments of the explosives, for use both in construction and maintenance.

The federal appropriation, to aid road building, which expires June 30, 1923, amounts to \$50,000,000, less 2.5 per cent which will be deducted for administration expenses. This leaves a balance of \$48,750,000 which has been allotted the states on a population basis, as is always done in the case of state aid.

There has also been authorized, but not appropriated, \$65,000,000 additional for the fiscal year beginning July 1, 1923. However, it is expected that when this authorization comes before the budget committee it will be trimmed down, but to what extent no one feels at liberty to say at this time. In any case, it is felt that at least \$50,000,000 will be again distributed as federal-aid in road building.

The department announces that reports made to the Bureau of the Census show a considerable increase in the activities of the establishments engaged primarily in the manufacture of cement during the year 1921 as compared with 1919. The total value of products reported amounted to \$203,627,000 in 1921 and to \$175,265,000 in 1919, an increase of 16.2 per cent. The increase in production was accompanied by increases in the number of persons employed, in the total amount paid during the year for salaries and wages, and principally in the cost of materials used. Of the 125 establishments reporting in 1921, twenty-one were located in Pennsylvania; twelve in New York; eleven in Michigan; nine in California; eight in Kansas; six in Ohio; five each in Illinois, Indiana, Missouri, and Texas; four each in Alabama, Iowa, Utah, and Washington; three in Minnesota; two in Colorado, Maryland, Montana, New Jersey, Oklahoma, Oregon, and Tennessee; and



one each in Georgia, Kentucky, Nebraska, Virginia, and West Virginia. Pennsylvania, the leading state in the industry in 1921, produced 26.8 per cent of the total value of products in that year. The returns indicate that the combined output of fall establishments was approximately 66 per cent of the maximum capacity, based upon a demand requiring full running time.

## Budget In Business

### It Can Be Made a Living Thing, Not Merely Red Tape, Says McCullough

Much has been written recently on the mechanics and machinery of the budget in private enterprise, but little has been said about the spirit behind the budget.

"It is this spirit behind the budget," says E. W. McCullough, manager of the Fabricated Production Department of the Chamber of Commerce of the United States, "which, in the last analysis, will determine whether the forms and procedure of budgetary control shall mean but another addition to the administrative red tape now cluttering business."

Mr. McCullough deals with this phase of the subject in a bulletin which his department has just issued under the title, "Budgeting for Business Control."

"The first point in a reasonable financial program," says Mr. McCullough, "is to aim for that amount of business within one's resources to handle which will give a fair return and which is founded upon a conservative view of the real demands of the consumer."

"The second is to strive to make the most of capital resources; establishing a production system; by refraining from plunging into expenditure for new plants and equipment where the old will serve the purpose; by placing collections on a reasonably prompt basis; by having purchases in line with production and sales programs and by refusing to act as a free warehouseman."

"The third is to regulate current borrowings in such a way that they will be well under control. As the business of a firm expands, the gap between the order and payment date increases, bringing with it a growing

need for banking accommodations. These banking requirements are usually granted, for the increase of business is a warrant of the success of the enterprise. New loans are made and old ones are renewed, and extended, until almost insidiously grows the conviction on the part of the manufacturer that the short term accommodations are fixed contribution to the capital of his business, and he acts and works upon this assumption. Inevitably, the day comes when the bank finds itself pressed for funds and, in turn, calls on the manufacturer for payment, and since such a demand usually comes at a time of business depression, the manufacturer finds himself unable to liquidate. Then very likely reorganization ensues, resulting at best in the short term funds becoming, upon onerous terms, a part of the funded or long term obligations.

"For all lines, seasonal and non-seasonal, it should be clearly realized that short time obligations are not a permanent contribution to capital and that manufacturers should hold themselves in readiness to liquidate when required, by at least maintaining a comfortable margin of cash and liquid accounts receivable over current indebtedness. Short term obligations should bear a definite relationship to the capital, or rather to those assets which are properly coverable by short term borrowing, and any unwarranted increase in this ratio should be regarded with alarm. The liquidation of debt ought to go hand in hand with the liquidation of inventories or accounts receivable and it is a danger signal if a given debt should carry beyond the liquidation of the inventory or other transactions for which it was incurred. The practice of some bankers of requiring a sixty to ninety day liquidation from non-seasonal as well as seasonal lines is a conservative influence and has a salutary effect, even though this requirement may mean only a rotation of loans among other banks."

Walter S. McKee has resigned as vice-president and director of the American Manganese Steel Company and will develop the business of the Inland Engineering Company of Chicago, of which he is president.

The convention and exhibit of the American Road Builders' Association will be held in Chicago January 15 to 19 inclusive.

## Eastern Trade Notes

### Market and Other News of the Pit and Quarry Industries in Several States

By Our Eastern Correspondent

As the winter season advances, sales are growing more restricted in the line of sand, gravel and crushed stone in the New York district, and even more so than would ordinarily be the case on account of the growing shortage of a number of basic building commodities. The scarcity has extended to the point of holding up current construction activities in different instances, and the necessary immediate relief is the outstanding feature in the local market.

Portland cement, an item of particular concern, continues to be available in desired quantities, but this encouraging condition is only momentary, and brought about by freight embargoes on building materials on New England railroads, primarily the New York, New Haven & Hartford Railroad, with consequent diverting to the New York district all cement shipments consigned to New England points.

A bright spot in the situation is the marked price stability now prevailing. Sand, gravel and affiliated products are holding well at established levels, despite decreased demand and increased supply. The availability of local sources of supply for these commodities also finds the industry in good condition for the closed months of the year, and as a whole, sales and distribution are expected to exceed those of 1921-22. Production in the Long Island producing sections is being controlled according to the demand, while sand and gravel plants in New Jersey and neighboring parts are keeping at it with good-sized working forces. The labor situation is fair, although in certain districts, such as the Raritan River section of New Jersey, there is a marked scarcity of men and accordant premium of higher wages for those who will work.

High grade washed gravel shows an advance of from \$1.75 to \$2.00 a cubic yard in cargo lots at New York, both for  $\frac{3}{4}$  and  $1\frac{1}{2}$ -inch stock. This establishes the same level as prevailed here last winter, and producers say

will hold for a number of months to come. Supply dealers are asking \$2.75 and \$3.00 for the material delivered on the job.

First quality washed sand shows no change from the prevailing \$1.00 a cubic yard price, wholesale, to contractors and dealers. An advance, however, to a slightly higher level, or around \$1.25, would not be entirely unexpected. Retail supply yards continue to quote at \$2.00 a cubic yard for Manhattan and Bronx deliveries. Fine white sand is being sold at \$4.50 a yard, delivered on the job.

Crushed stone prevails at a \$1.65 level for  $1\frac{1}{2}$ -in. stock, cargo lots f. o. b. city, with smaller material  $\frac{3}{4}$ -in., priced at \$1.75. These figures are from 10 to 25 cents a cubic yard below those of this same time a year ago. Local supply yards are turning the material at a flat rate of \$4.00 a cubic yard, both sizes, delivered on the job.

Portland cement, with its ups and downs, has re-established a \$3.20 per barrel rate in the New York district after an advance to \$3.25 for October and early in November. The bag rebate of 10 cents holds as heretofore but with much keener disposition on the part of the producers to secure all bags possible for immediate refilling. In the wholesale market, dealers and contractors are paying \$2.30 a barrel for material alongside dock, and \$2.50 for delivered wholesale stock, less bags. A month ago, these figures were \$2.55 to \$2.75.

Lime is showing a tendency to reach and stay at higher levels, and the past month shows changes in quotations. Hydrated finishing material has increased to \$17 and \$17.50 a ton at the warehouse, wholesale, with common hydrate stock holding at \$13.00 and \$13.10. Hydrate finishing stock in paper bags is being sold by dealers at \$24.00 a ton, and common hydrate, similarly packed, at \$19.50 per ton, delivered. Lump lime, common, is priced at \$2.75 and \$3.10 per barrel at the warehouse, and finishing stock, at \$3.60 to \$3.65, wholesale. The latter in 300-pound barrel is being retailed at \$4.50 at the dealer's yards, delivered to job, and common lump lime, same size container, at \$3.75. Wall plaster shows no change from previous levels.

The Norton Stone & Lime Corporation, Cobleskill, N. Y., has been formerly under state laws with a capital of



\$500,000. to operate lime properties, stone quarries, etc. The company is headed by A. L. Norton, Cobleskill.

The Phoenix Stone Co., New York, has been incorporated under state laws with a capital of \$50,000, to operate stone quarries. The company is headed by T. F. Conlon, R. W. Owens, Jr., and J. J. McGinty. It is represented by Van Doren, Conklin, McNevin & McClenthen, 31 Nassau Street, New York.

The Palmer Concrete Products, Peabody, Mass., is arranging for heavy production at its Mansfield gravel pit. A plant is being established for the manufacture of a line of concrete building products, blocks, etc.

The Imperial Granite Co., Quincy, Mass., has been organized under state laws with a capital of \$20,000, to operate a local plant. S. W. Giarrusso is president; and Adolph J. Restelli, treasurer, Quincy. The last noted represents the company.

The production of sand and gravel in New Jersey continues to show a marked increase from year to year, and the official figures of the 1921 output, just compiled by the State Department of Conservation and Development, Trenton, are of more than ordinary interest. The production of stone in the year noted reached a total of 684,207 short tons, valued at \$2,653,008; this is an increase of 4,487 tons over the output of the preceding year. Trap rock showed an increase of 125,230 tons over the production for the previous year, while other stone, such as granite, slate, sandstone, etc., aggregated 113,567 tons output in 1921, or more than 12,000 tons over the figures of the preceding twelve months.

All of the slate quarries in the vicinity of Wind Gap, Pa., are in active production, giving employment to a full working force on full time basis. A number of the quarries have adopted an overtime schedule. Heavy orders for material have been received and it is expected to continue on the present schedule for a number of weeks to come. A number of new slate mills are being projected in this district, among these being a particularly large plant for A. F. Teel, Wind Gap. Plans are in progress for the mill.

The American Lime & Stone Co., Bellefonte, Pa., has foundations under way for the construction of a new three-story building at its plant, about

36x50 feet, to be used for operating and office service.

The State Highway Department, Harrisburg, Pa., is maintaining active production at its quarry at Atglen, near Coatesville, Pa. There is a heavy call for material for road work, and a large working force is being employed.

Limestone quarries at Avondale, near Coatesville, Pa., are preparing to resume operations at an early date, following a considerable period of inactivity. Working forces are now being secured, and it is expected that more than 300 men will be employed.

The Cambria Steel Co., Johnstown, Pa., is perfecting plans for improvements at its limestone quarries at Naginety, Pa., to include three additional storage structures and equipment. Five steam shovels will be installed to replace the present hand-digging system, and the working force will be increased to 200 men. It is expected to develop an output of from 25 to 30 carloads of graded limestone per day for use at the steel mills at Johnstown. A number of new dwellings will be built in the vicinity of the plant for the additional employees.

The H. L. Cannady Co., Wilmington, Del., has been organized under state laws with a capital of \$100,000 to operate stone quarries. The company is represented by the Corporation Trust of America, du Pont Building, Wilmington.

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## New Link-Belt Catalog

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A new Link-Belt portable loader catalog has just been issued by the Link-Belt Company, Nicetown, Philadelphia, Pa., embracing their entire line of portable equipment. Copies can be obtained by addressing the manufacturers.

It is 8½x11 in size and contains complete specifications of all of the standard machines which include the large one-man power Swiveling loader, the portable belt conveyor, the standard type "A" machine for anthracite coal, the "CS" loader for handling sand and gravel, in fact it is the most complete book of its kind ever issued by the company.

## No Cold to Hinder Work

### Texas Has Not Yet Felt Any Seasonal Decline

By Our Dallas Correspondent

A more optimistic tone prevails in the sand, gravel and crushed stone business in Texas, although scarcity of railroad cars still proves a great drawback. So far there has been little or no decline in building, and road construction and street paving work is going forward with redoubled activity. The seasonal decline in building operations in this part of the South is not great, and so far there has been no cold weather to hinder operations at all.

Prices are holding steady, although there is a slight weakening. Were it not for the scarcity of railroad cars and the slowness of deliveries it is believed that prices would show a drop, but the pressing demand for these materials is made more pressing by the difficulties in getting deliveries, and prices are holding up well.

Several Dallas and Fort Worth firms were badly hit by the Government priorities order, but so far there has been a marked ability to weather the storm and all companies doing business in this section will come out on top. The J. Fred Smith Gravel Company of Dallas, Clem Gravel Company of Dallas, Trinity Sand and Gravel Company of Fort Worth and Dallas, and Vilbig Bros. all suffered loss in business through the priorities order, for these companies either depend altogether or in large part on the railroad companies in making deliveries.

Work on Dallas county roads now under construction in completion of the highway building program entered upon two years ago when the county voted a bond issue of \$6,500,000 for good roads was slowed up on account of a shortage of sand and gravel, but this work is now going forward with renewed activity. The county operates a fleet of Government motor trucks and does much of its own hauling, but the sand, gravel and other materials are usually shipped by rail to some point near the construction work, and are hauled by motor truck from the railroad switch to the workmen on the road. In this way the haulage is reduced and better speed is made on the

various jobs, to say nothing of the reduction in cost of the work.

The county is now building what is to be known as the Belt Highway, a graveled road entirely encircling the city of Dallas near the borders of the county, and connecting all the cardinal roads that radiate from the city as the spokes of a wheel from the hub. Most of the cardinal roads are of concrete construction, and they are practically finished now, or contracts well advanced.

Contracts for the construction of the Lancaster Pike, extending from Dallas to the county line at Lancaster, south of Dallas, a distance of 14½ miles, have recently been awarded by the County Commissioners of Dallas county. Contract for the crushed stone and macadam base was awarded to Fuller & Co. of Dallas, for \$221,741.08. The county in addition will furnish 31,300 cubic yards of crushed stone and 40,000 cubic yards of native stone, at an estimated cost of \$94,000. Contract for the surfacing of 1½ inches of asphaltic binder course topped with 1-inch sheet asphalt was awarded to Wear & Thomas of Dallas for \$200,364.06. This will bring the total cost of construction of the 14½ miles of roadway to \$516,105.14. Contractors have begun work and the contracts call for completion of the job by Jan. 1, 1923.

The city of Dallas is also going forward with its street paving program and contracts aggregating more than \$250,000 have recently been awarded.

The city of Houston last week awarded contracts for graveling more than one mile of streets. The property owners pay for the gravel while the city pays for the cost of putting it on the streets.

Highway construction work in Tarrant county has been slowed up by failure of contractors to get gravel or account of the car shortage, and highway construction work and street paving in several Texas cities has been materially curtailed.

The County Commissioners' Court of Tarrant county have ordered bids for grading and surfacing with gravel 10.31 miles of the Arlington-Mansfield Road. It is estimated that between 50,000 and 60,000 cubic yards of gravel will be employed. The County Commissioners of Henderson County last week contracted to purchase 10,000 cubic yards of gravel from J. L. Wherton of Navarro county for use in high-



way building. The gravel was sold in the pit at 50c per cubic yard, and the county took an option to purchase 10,000 cubic yards more at the same figure.

The Gaudalupe River Navigation Company of Victoria, Texas, has moved its gravel pit and all loading equipment, including steam shovels and drag lines, to a new location about  $1\frac{1}{2}$  miles distant. The move was made necessary by exhaustion of the gravel supply in the old location. New loading equipment will be placed with a capacity of 20 cars a day, which will be enlarged as needed, it is announced.

D. M. Picton & Co. has contracted to furnish 8,000 tons of crushed stone for Federal Government work at Port Arkansas, Texas, to be used in extending spurs, repairing jetties and the St. Joseph Island dyke. The rock will be brought from Picton & Company's quarries at Beckmann, Texas.

A. O. Neumann, proprietor of the Gonzales Cement Works at Gonzales, Texas, announces that he will build a new plant to be located near the Southern Pacific Railway station, on what is known as the old Schleyer homestead. The main building will be 50x88 feet, two stories high. Another building 40x50 feet will be built. The plant will manufacture cement, fancy tiling for floors, hearths, mantels, etc., and face brick of various colors and textures.

The Brackettville Rock Quarry, owned by the Government, near Brackettville, Texas, has been reopened after a period of idleness covering a period of several years.

## "Pennsylvania" Armorframe Single Roll Coal Crusher

The latest development of the single-roll crusher, which marks a fundamental improvement in design, provides a frame fabricated from slab steel plates into an unbreakable unit, and is the product of the Pennsylvania Crusher Company, Philadelphia.

In the 18x18 inches and 18x24 inch sizes, in which this design is now available, the steel side plate are 1 inch in thickness, and are connected by nine steel cross members all heavily hot riveted into this rigid box frame.

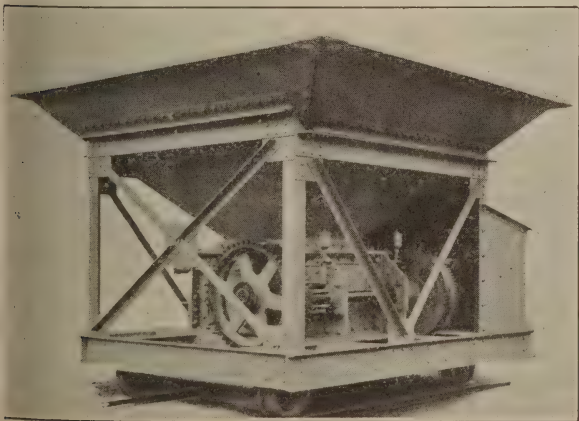
Bronze bushed bearings are shouldered into the heavy side plates so that the bearing bolts are not subjected to shear.

The heavy flywheel pulley which drives the roll through heavy cut back gearing, is provided with a shear pin safety device, mounting a steel bolt in hardened bushings, thereby insuring full protection of the crusher parts against the accidental introduction of tramp iron with coal.

The breaker plate is a massive casting of high-grade charcoal iron deeply chilled on the crushing surface. It is hinged in the frame at the upper end and suspended at the lower end by means of powerful relief springs. The breaker plate tip which takes most of the wear, is a reversible and renewable manganese steel casting.

The segmental roll is cast from high-grade charcoal iron, deeply chilled, or from chrome steel.

The crusher proportions are unusually liberal throughout, and the design insures a continuous supply of uniformly crushed coal by affording the three safeguards, — unbreakable steel frame, steel shear pin safety device and powerful relief springs—as protection against the heavy tramp iron encountered in R. O. M. bituminous coal which often has proven destructive to crushing machinery.



## Cement Mill News

### Items of Interest From the Important Producing Districts

Cement mills in the Lehigh Valley section of Pennsylvania are maintaining operations at a maximum point. There is no let-up, nor any indications of let-up in sight, and it is likely that curtailments for a number of weeks to come will occur only through absolute necessity for equipment repairs or other essential plant work. Orders on hand are sufficient to give the greatest encouragement to the situation, neglecting the incoming orders that are piling up and making reserves a remote thought. There is no opportunity whatever to accumulate any stock for storage and comply with current demand, and as a consequence, storage bins continue empty.

The labor situation has righted itself to an appreciable extent, and sufficient working forces are more pronounced. There has been no change in the wage scales during the past fortnight, and this question, with the recent increase, seems to be settled for the time being.

The movement of stock to destinations is still the critical factor to be considered. While freight embargoes on cement and other building materials are gradually being discontinued, the shortage of cars and locomotives brings about a condition equally as bad. Mills are falling far short of their requirements in this direction, and there is no indication of any immediate relief. Fleets of motor trucks are now being pressed into service for haulage to reasonably near points of delivery, or to rail connections where no embargo is operative.

The latter plan is being developed quite intensively at Catasauqua, to which point motor trucks are operating from the mills. Here it is being loaded on cars of the Central Railroad of New Jersey, which has no embargo, and moved to eastern and western points. Many tons of cement have been handled in this way, expensive as it is, during recent weeks.

Another matter of considerable importance at the present time is the bag shortage. The freight embargoes have made for an accumulation of bags at different points which cannot be moved by rail until the restrictions

are modified. Consequently at New York, different points in New England and New Jersey, and at other locations, dealers' warehouses are being glutted with the empties, while the mills are in extreme need and cannot secure the bags. Efforts are being made to relieve the situation.

All mills in the vicinity of Coplay, Pa., are continuing at maximum capacity, not only in the production of cement, but in the line of raw material for continuous operation. These include the plants of the Lehigh Portland Cement Co., at West Coplay; the Coplay Cement Mfg. Co.; the Atlas Portland Cement Co.; and others. The amount of rock being accumulated indicates manufacture practically throughout the winter.

A distinct improvement has been made in blasting work in the district just referred to, and a new plan is now operative. The holes for the dynamite are being drilled about 10 feet apart, instead of about twice this distance as heretofore from the face of the quarry. Although more dynamite is necessary to loosen a given amount of rock, it is blasted into finer parts, thus eliminating the need for further blasting after the rock has fallen to the bottom of the quarry.

The Atlas Portland Cement Co., is maintaining heavy production at its large mills at Northampton, and all other plants of the company in the Lehigh Valley section are on the active list. Similarly, the Lehigh Portland Cement Co. mills at Allentown, New Castle, Ormrod and vicinity are running full under maximum output. Other large producers, such as the Alpha Portland Cement Co., Easton; the Nazareth Cement Co., Nazareth; the Giant Portland Cement Co., Egypt; and the Lawrence Portland Cement Co., Northampton, are equally active on full turn, and there is no thought of curtailment.

With a plentiful supply of coal and improvement in the labor situation, the mill base in the Lehigh Valley section has receded to a more practical point in accord with winter demand. The advance to \$2.25 a barrel in car-load lots, without bags, as set forth in the last issue of PIT AND QUARRY, has been supplanted with a basic figure of \$2.10, at which point cement is likely to remain for a number of months.

Mill bases in other important producing districts have also declined for



the reasons noted, and present figures give a more equitable retail price to encourage consumption through the cold weather. At Hudson, N. Y., there has been a decline from \$2.35 to \$2.20, with a like condition prevailing at Fordwick, Va. Mills at Mason City, Ia., have dropped the figure to \$2.05 from a former base of \$2.35, temporarily established; the same quotations are current at La Salle, Ind., and Mitchell, Ind. The Universal Portland Cement Co., Universal, Pa., is asking \$2.00, while mills at Hannibal, Mo., are quoting \$2.10, and at Leeds, Ala., \$2.20. Buffington, Ind., and Steelton, Minn., continue with a \$1.95 base.

The Lehigh Portland Cement Co., Allentown, Pa., has awarded a contract to Dwight P. Robinson & Co., Inc., 125 East Forty-sixth Street, New York, for the erection of its proposed new cement mill at Tarrant City, near Birmingham, Ala., referred to in the last issue of PIT AND QUARRY, and actual construction has been commenced. The plant will be equipped for a maximum production of 1,000,000 barrels of cement per year and will cost close to \$2,500,000. Work will be pushed on the erection and it is expected to have the mill ready for initial service early in the fall of 1923.

The new mill of the Lehigh Portland Cement Co., referred to above, will make the fourth such plant in the Birmingham district, and the fifth cement mill in the neighboring section. These include the plant of the Atlas Portland Cement Co., at Leeds, with an annual rated output of 1,000,000 barrels; the National Cement Co., at Ragland, with a production of 750,000 barrels per year; the mills of the Southern Cement Co., at North Birmingham, with rated production of 150,000 barrels yearly; and the plant of the Gulf States Portland Cement Co. at Demopolis, manufacturing at the rate of 300,000 barrels per year. This makes a gross production of 2,200,000 barrels per year for this section, exclusive of the new Lehigh mill, as well as the plant of the Phoenix Portland Cement Co., also now under construction, and which mills will practically double this rated output.

All of the mills in the Birmingham district are now running at full capacity, and have orders on hand for a number of months to come. The labor situation holds up well and practically all of the men required are

available. The bulk of production is finding its way into new buildings throughout the southern territory, and the demand from this source indicates no let up now in sight. The Gulf States Portland Cement Co. has plans under way for the construction of additions to its plant to double, approximately, the present output, which is now running on an average of 1,200 barrels per day.

Plans are under way for a new cement mill at Zawiercie, Poland, with equipment to be of American manufacture. The Philadelphia Commercial Museum, Foreign Trade Bureau, Thirty-fourth Street, Philadelphia, Pa., has received an inquiry regarding the projected plant, asking for information pertaining to necessary equipment, and will give preference to modern apparatus. The company sets forth that it is now operating a plant with two rotating furnaces, and will construct a new unit with capacity of about 40,000 metric tons per year. The installation will comprise a rotating furnace of this size, with cooling apparatus and other auxiliary equipment. The Bureau will give full information to those interested upon request.

The Superior Portland Cement Co., Concrete, Wash., has commenced the construction of a new addition to its plant for increased production. It will consist of a main one-story building, 125x250 feet, estimated to cost approximately \$100,000. It is planned to place the unit in service immediately upon completion. The general building contract has been let to the Rounds-Clist Co., Seattle, Wash. The company is running under goods production at its plant with heavy call for output, and will continue at maximum for an indefinite period.

American cement producers, and particularly those engaged in export activities, are expressing considerable interest in the aggressiveness of cement mills in Belgium and Germany, which are making all sorts of inducements to secure business, and reducing prices to a low point. The propaganda now under way has worked to the detriment of a number of the French cement plants, particularly those at Boulogne-sur-Mer, which are the largest in this country, with annual capacity of 600,000 tons per annum, or about three-fifths of the gross French production.

## Stocking For Winter

### Prospective Demand Will Make This No Small Job

By Our Louisville Correspondent

The end of the busy season in carlot shipping draws near at this writing and the sand people here will center quite a lot of their attention now on stocking their yards for winter. It will take busy hustling with their river equipment too because the demand has been fairly lively this fall and this has held stocks down some. And this together with prospective demand through the winter will make necessary unusual efforts to stock supplies enough to run through winter.

Usually winter sand and gravel digging continues till cold weather interferes and hope is expressed this year that they may work up till the end of the year and at least till the middle of December.

The building boom in Louisville has helped out considerably this year, and the best of it is there are many new projects being planned and started even now at the end of the season. One recent estimate shows at least ten million dollars in large undertakings ranging from half a million to three and a half million dollars each now under way and being planned. Among them is a million dollar river terminal, a new hotel building and a number of buildings which will call for an unusual quantity of sand and gravel, so it looks like busy days all through the winter.

Low water in the river practically tied up all river transportation the latter part of September and the first half of October but the sand and gravel people managed to keep at work and lately there have been rails that have brought a more normal stage to the river.

During the second week of October the Kentucky Road Engineers held an interesting meeting at Ashland, Ky., and there was a delegation of about ten from Louisville went to the meeting, among them being J. E. Lloyd, manager of the Louisville yard of the E. T. Slider Co., Mr. Lloyd said it was a good convention, well attended and full of business.

Speaking of trade conditions with the E. T. Slider Co., Mr. Lloyd says

that they have not been troubled much lately in getting cars, perhaps partly because the carlot trade is now approaching the end of the season and is not so brisk. The season as a whole has been good in the carlot trade but perhaps even more active in the local trade. In fact, they have had enough doing that they will have to hustle from now till cold weather with their river equipment to get enough stock to carry through the winter.

The Ohio River Sand Co., which was among the exhibitors at the Kentucky State Fair recently, was also among the exhibitors at the Better Homes Exposition at the Armory in Louisville the week of October 23 to 28.

The cement mills and brick plants of this section are now being relieved from the coal stress which interfered with operations for a while as plenty of coal is now available and coal prices are easing down to something more like normal. This helps somewhat, in relieving the general car situation so that while there is still complaint of car shortage and slow transportation it is not as bad as some would have us believe and there is promise that the stress in transportation will be passed before midwinter.

R. B. Tyler, who recently secured a contract for 15 miles of roadway from Camp Knox to Elizabethtown, intends to equip three new crusher plants to furnish crushed stone for the job. He will put one at each end of the road section and one at mid-way so as to minimize the truckage. He says he is busy with other quarries and road contracts and expects to keep going as long as the weather permits and is hoping for an open winter so that the work can go right along. Reported from out in the state, he says, indicate that quarries supplying rail material are operating right along and getting cars enough to keep reasonably busy. It has been a poor year for commercial quarry work but a very good year for railway material and road building.

The Owen Bucket Company, Cleveland, Ohio, has just issued a little folder on the Type "J" bucket, describing and illustrating this bucket completely, and showing also, eight reasons why it costs less to operate, is more durable and insures a bigger day's work. This folder will be sent by the company upon application.



## Pittsburgh News Notes

### Activity is Carrying Well Into The Late Season

By Our Pittsburgh Correspondent

Good activity prevails in the sand and gravel markets at Pittsburgh, Pa., and in addition, there is plenty of dredging work going the rounds to enhance the operations of a number of the prominent sand-digging companies. There is good distribution at the Pittsburgh landings for contractor and dealer accounts, and a large tonnage has been absorbed during the past month. The clear, open weather is helping the situation and there is no immediate thought at anything more than regular seasonal curtailment.

Washed gravel shows no change in price in the Pittsburgh market. The material, f. o. b. float is selling at \$1.60 a yard; delivered on the dock, it is \$2.00, while for distant hauls, the figure ranges to \$3.00, according to distance. Crushed stone is selling wholesale for \$2.85 a cubic yard, in cargo lots, both  $\frac{3}{4}$  and  $1\frac{1}{2}$ -inch stock, while supply dealers price the material at \$4.00 upwards. River sand is around \$1.35 a yard, wholesale, with retailers asking from \$2.35 to \$2.50 for delivery on the job.

The Iron City Sand Co., is working on the upper Allegheny River with its digger, and using its towboat "Iron City," for hauling sizable quantities of material to the Pittsburgh landing. The towboat, "P. M. Pfeil," is also busy with heavy barge loads of sand and gravel for local distribution.

The Rodgers Sand Co., is keeping three towboats, "Margaret," "Sweetlake," and "Twilight," in active service on the river, both for sand and gravel distribution and handling of empties. A heavy wholesale account has prevailed throughout the month, with deliveries to Clairton, Ambridge, Parnassus and other points on the river. The sand diggers are busy in the vicinity of Cheswick and the bulk of supply is coming from this point; the towboat, "Twilight" has been running to Fourteen-Mile Island for tons of sand and gravel. A number of repairs have been made to the boats, including boiler work on the "Margaret."

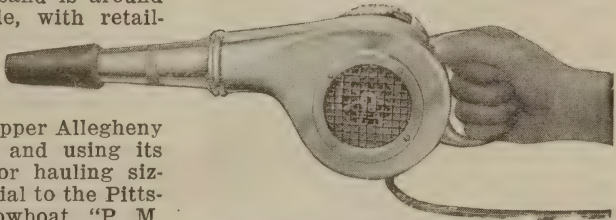
The J. K. Davison Co., will place a new hull on its towboat, "Bronx," which was damaged by fire recently; the machinery was only slightly damaged and this will be repaired. While the vessel is idle, the company will use its sand dredger, "J. K. Davison," as a tow boat. The company is operating under an active call with good distribution.

The Keystone Sand & Gravel Co., is continuing production in the Neville Island district, and the towboat "Victory," is bringing many loaded barges from this point.

The sand digger "Catherine," of the Ohio River Sand Co., has recently been inspected, and the boat will be continued in active service. The Marine Mfg. & Supply Co., is making a number of repairs to the sand digger "Wabash," at its local plant.

### Cadillac Portable Electric Blower

A handy device for the plant where grit accumulates is the Cadillac portable electric blower. This device effectively removes grit, dust and dirt from all types of machinery, such as motors, generators, switchboards, and



other power plant equipment which may be kept clean in no other way.

The blower weighs but six pounds, has a  $\frac{1}{2}$ -inch nozzle outlet, and blows about 20 cubic feet of free air per minutes with a motor speed of 11,500.

This blower has a wide range of usefulness and does the work of elaborate and expensive vacuum and other cleaning systems. Even though compressed air is available, there are places where it is not practical to use it owing to inaccessibility. The Cadillac, being electrical, may be operated when the plant itself is not in operation, for it is only necessary to connect the blower to an ordinary lamp socket to bring it into action.

The Cadillac electric blower is manufactured and sold by The Clements Mfg. Co., 614 Fulton St., Chicago, Ill.

## News From Cincinnati

### Donnelly, Hall, and Others, Give Their Views on the Present Situation

By Our Cincinnati Correspondent

Material prices continue to hold firm with a demand almost commensurate with the supply. Prevailing weather conditions have given ample opportunity for stone quarries and sand producers to continue operations, and it is predicted that a sufficient storage of these materials will be available for the early spring demand. Local river sand operations have received encouragement from the easy access and economical performance, due to the low stage of the Ohio River. Little rain for the past two months has fallen in the Ohio Valley, and all river activities have profited thereby. Prices are of a well established level, the quotation for sand being \$1.15 per ton f. o. b. cars, gravel, \$1.40 per ton, and cement ranges a little over \$3.00 per barrel. There is a smaller demand for lime, and the ready supply of this material from closeby Ohio producers has made a price of \$11.50 a ton for mason's lime, and close to \$15.00 per ton for finished lime.

The market in this district is not without its misgivings, and considerable disquietude amongst operators and dealers is evident. The railroad situation in some cases has caused downright consternation, and has caused no end of interruptions and serious delays in the industry. Priority orders and railroad embargoes have left business in a state of uncertainty, with the future conditions portending a bad railroad condition of some duration. The importance of the railroad is so stressed by Harry Donnelly, president of the Ohio Gravel Ballast Company, and a past head of the National Association of Sand and Gravel Producers, that he declares that, "the future of the sand and gravel industry is dependent upon the early clearing of the railroad difficulties." Mr. Donnelly is in close touch with Washington endeavoring to find out how soon the situation will improve, but says that definite predictions as to the industry are impossible, and that no one is in a position to foretell just what the immediate outcome will be. Mr. Donnelly's Company has felt the effect

of the small demand for ballast from the railroads, and the company's operations have been temporarily reduced to half.

J. E. McCracken of The J. E. McCracken Supply Co. plainly tells of the detrimental effects of the railroad car situation. Mr. McCracken announces that the coal priorities and other priorities have left little or no available cars for disposition to the basic products transportation. He explains that much material must be stored, because of the deficiency of cars to carry the material from the river banks and from the pits. As a consequence of the insufficiency of transportation facilities, dealers are suffering according to Mr. McCracken and are unable to procure large amounts of material at any one time. The Moores-Coney Company and other large dealers are effected likewise.

The Cincinnati Quarries Company and the Red Bank Gravel Company and other producers have been given a setback due to the failure of the local increased tax levy to carry by a majority vote at the November election. Little or no street construction or repairs have been made for a number of years, and a more strict retrenchment policy, including the foregoing of all street work, will be necessary for the coming year.

It is evident that the extensive building boom has greatly contributed to offset other unfavorable conditions and any prevalent dismay is only temporary, and building construction has after all reposed much confidence in the future stability of the basic material market. This is the feeling of Fred Tapmiller of The H. Webb Company, who reports a good demand with a fairly optimistic future.

Fred E. Hall, president of the Ohio Sand and Gravel Association, has a word of encouragement for the producers of sand, gravel, cement and lime and having come from a meeting in Chicago recently, he believes that all pit and quarry operators may expect an outlook which bids fair to equal or exceed the business done since the termination of the war. Mr. Hall is preparing to attend a conference at Columbus, Ohio, to discuss a rate hearing on sand and gravel, on December 14th. The Ohio association will endeavor to combat any effort of the railroads to increase the rate on all basic materials.



## Steel Conveyor Belts

The flexible steel conveyor belt known on the market as the Sandvik belt, which has been extensively used in Europe in the past, and is now being used in this country, is manufactured by the Sandvik Steel Works, Sandviken, Sweden.

It is made of the very best Swedish charcoal steel, cold rolled, hardened and tempered—hence, has a hard, smooth and dense surface. It comes in straight strips as long as 350 feet, and only .04-inch thick, with rounded and smooth edges, in different widths, weighing from one to two pounds per running foot. It is so flexible that a 16-inch belt 350 feet in length can be rolled into a compact coil and packed for shipment in a box only 2 feet square.

At present the widest belt manufactured, and the one in most general use, is a 16-inch belt. The steel belt is, however, rigid, and while a rubber or textile belt cannot be loaded out to the edges because vibrations would cause spillage, almost the entire width of the steel belt can be used, and in this way a 16-inch steel belt can carry about the same load as a 16-inch troughed rubber belt.

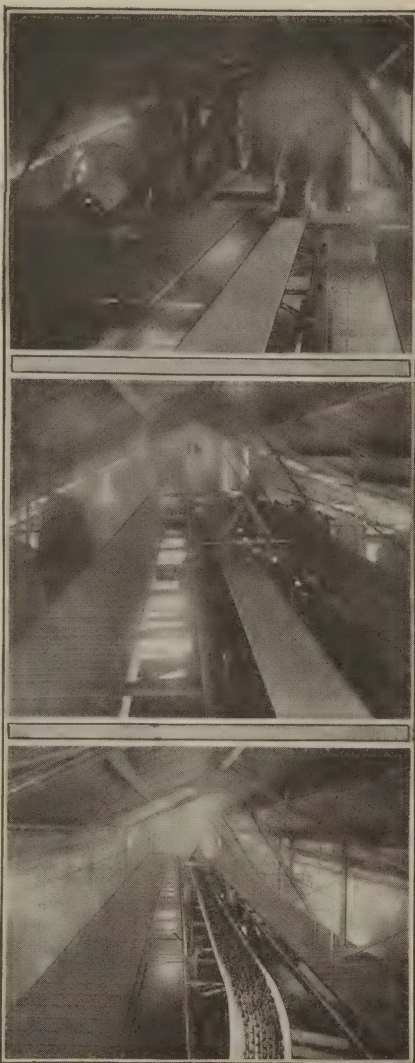
Of course, the rigidity of the steel belt prevents troughing. However, when handling non-abrasive materials a trough can be used—built narrower than the belt and clearing it, or the belt can be run in the bottom of a trough with ample clearance between the edges of the belt and sides of the trough, to take the place of the usual troughed rubber or balata belt, and thus a greater capacity is obtained.

When handling non-abrasive materials the steel belt may be made to slide on wooden runners which soon acquire such a polish that the friction, and consequently the power consumption, are almost negligible. We refer to this as the "sliding type" conveyor.

The most common type of installation is the "rolling type" where both strands of the belt are carried on rollers in the usual way—the idlers on the top strand spaced 6 to 13 feet apart, depending on the material conveyed, with 35 feet spacing for the return strand idler.

A combination of the rolling and sliding type can also be used.

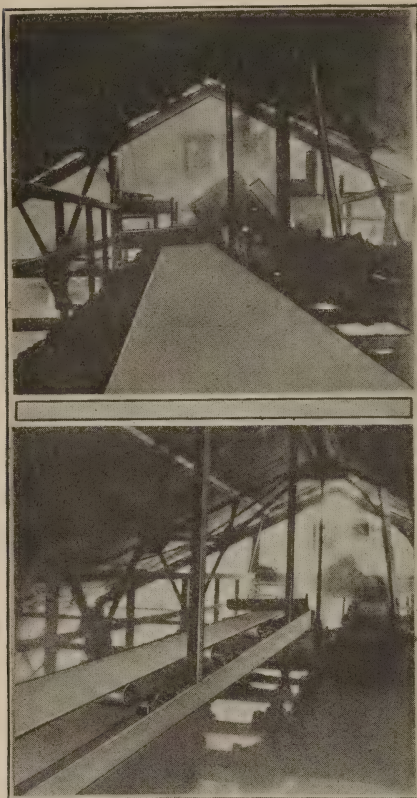
The drive can be arranged at either head or tail end to suit local condi-



Installation of Sandvik Steel Conveyor Belt at Plant of Michigan Portland Cement Co. Chelsea, Mich., handling hot clinker.

tions, and if desired, both strands can be used at the same time for conveying in opposite directions, and under proper conditions the conveyor can be made reversible.

The belt can be installed on an incline, depending on the material handled—1 in 4 is the usual limit for a smooth belt that has to be scraped off for unloading, but if terminal un-



Two Views of Installation at Penn-Allen Cement Co., Penn Allen, Pa., Handling Limestone

loading only is used, slats or small angles can be fastened to the belt at intervals and the incline increased to about 1 in 2.75.

The belt is very easy to install—in most cases of replacement the existing structure can be adapted to accommodate the steel belt, and it is even possible sometimes to use existing idlers and end pulleys, with slight alterations.

One essential feature of installation is the terminal pulley diameter which must have a certain ratio to the thickness of the belt—for a 16-inch belt a 40-inch diameter pulley must be used. In passing over this pulley the steel belt is subjected to a stress of from 28,000 to 30,000 pounds per square inch, and it has been found that with continuous bendings over a period of years, with a bending frequency

which we endeavor as far as possible to keep about 1 per minute, the molecular structure of the steel is not affected. Standard practice is to make the face of the pulley three-quarters the width of belt, crowned in the usual way, but one-third in the center made flat.

The speed depends on the length of conveyor—ordinarily between 135 and 300 feet per minute, and the capacity is thereby determined. For the average length conveyor, however, the average speed is about 200 ft. per minute. Installations as long as 800 feet on centers have been made.

### “Primm Primer” a Good Looking Publication

A newsy little publication, that quite a number of Pit and Quarry readers must have already received is the “Primm Primer” published by the Power Manufacturing Company, Marion, Ohio. Volume 1, No. 1, of this publication came out under date of September, 1922, and made its bow to the engineering trade without pretentious promise, but with every indication of being well worth while. The chief feature of the first issue was an article on “The Development of Oil Engines” by R. O. Bresler, M. E., of the Power Manufacturing Company. Another article on the Power Company foundry, a page of news and another of humor, together with other pages illustrating the various Primm engines, made up the number.

The Osgood Company of Marion, Ohio, manufacturer of steam shovels, has established a district sales office in New York City, located at 50 Church St., with Mr. M. E. Pullen in charge. All business of the Osgood Company which was formerly handled by Mr. M. E. Davis, the former New York representative will now be handled through the district office.

The Standard Sand & Gravel Co., Wheeling, W. Va., which was organized August first of this year, is growing rapidly. Some of the equipment installed by this firm is the largest in the Ohio Valley, their dredge boat the “Sandow” being the largest one between Pittsburgh and Cincinnati. Walter Armstrong is president of the company, which maintains offices in the Board of Trade Building.





Link-Belt Crawler Crane with cab removed showing roomy platform for operator and accessibility of machinery

# The New Link-Belt Crawler Crane

*A Sturdy Reliable Machine for All-Around Service*

The new Link-Belt Crawler Crane is built to the high standard of quality characteristic of all Link-Belt products.

It can operate with a hook-block, grab bucket, drag-line bucket, skimmer bucket, steam shovel attachment, electric lifting magnet, wood grapple, or pile driver attachment. It weighs 22 tons and can lift 10 tons at 12 ft. radius, or 3 tons at 30 ft. radius. The standard boom is 35 feet long.

The crane rotates four complete revolutions per minute, travels three-quarters of a mile per hour, and can easily climb a 20 per cent grade.

The crane is a one-man machine, because steering of the caterpillar truck is controlled in any position of the upper rotating base by a lever at the operator's stand in the cab. Complete specifications, price, and delivery upon request.

**LINK-BELT COMPANY**

Chicago—300 W. Pershing Road

Philadelphia—Hunting Park Ave. & P. & R. Rwy.

# LINK-BELT

## New Crane Excavator

Koehring Company, Milwaukee, Wis., has recently placed on the market a crane excavator, which is designed for any kind of material handling, excavating or grading. It may be equipped with dragline, orange peel or grab bucket, power shovel attachment, pile driver leads, magnet, or block and hook.

The Koehring crane excavator has a full circle swing and is furnished with either a canopy top and drop curtains, a half cab or with an enclosed cab.

All levers are conveniently banked at the right front side, in such a way as to give operator complete view of all parts of the work. All movements are independent of each other, and can be operated separately or in any combination desired.

Mounted upon full length multi-planes, it has forward and reverse traction, with a positive steering arrangement, and is able to travel anywhere.

When working at stock piles or in restricted quarters, no traveling of the crane is necessary. The clamshell bucket may be boomed in or out, as often as necessary, to reach materials without moving the crane. This distinctive and invaluable feature is accomplished through the use of a spur gear drive and large friction clutch, giving operator absolute and instant control with maximum output. A double drum winding up the boom hoist cable equally on each side, equalizes the stresses in boom members.

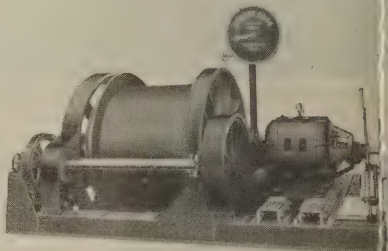
The Koehring Crane is built in two sizes, the No. 2 crane, having a capac-

ity of 12 tons at 12 foot radius and the No. 3 having a capacity of 20 tons at 12 foot radius.

## Consolidation

Announcement is made of the consolidation of the Street Bros. Machine Works and the Patten Manufacturing Company, both well known and prominent manufacturers of hoisting machinery, of Chattanooga, Tenn. The above companies have been prominently identified with the construction machinery industry for the past fifty or twenty years.

"Street's" extensive line of large hoisting equipment, together with the complete line of small and medium



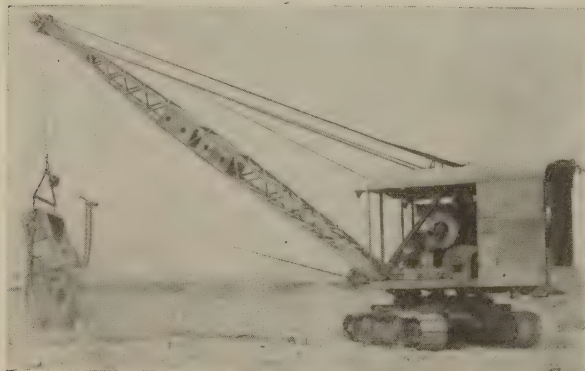
size Patten hoists, will form a more comprehensive and up-to-date line of modern hoisting equipment, consisting in its branches of the following:—All sizes of electric, gasoline, steam, and belt hoists, mine hoists, cargo hoists, capstans, winches, wood and steel derrick, etc.

J. H. Street will continue as president of the enlarged company, and

W. Burrell, sales manager of the Patten Manufacturing Company, will be sales manager of the "Street" Company.

The title of the new company will be Street Brothers Machine Works, Inc.

Robert Lutz, 127 Knopp St., Madison, Wisconsin, has purchased rock crushing equipment for a \$75,000 sand, gravel and crushed stone plant from Allis-Chalmers Mfg. Co., Milwaukee.



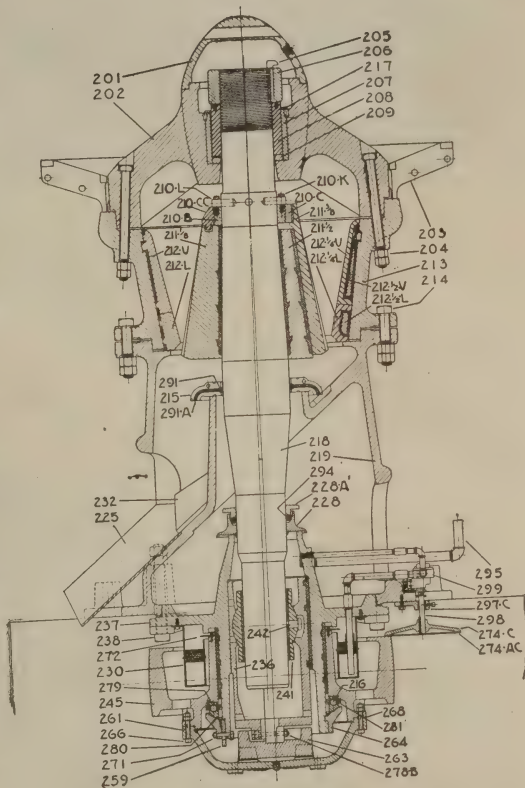
Koehring Crane Excavator



# KENNEDY BALL BEARING GEARLESS CRUSHERS

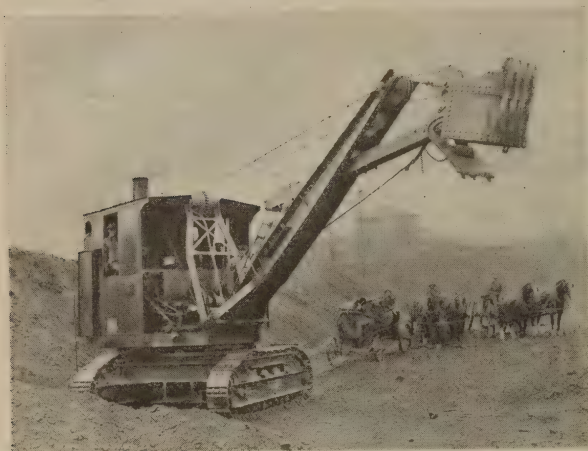
## WHY THEY LEAD

- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it can not break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.



Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

**KENNEDY VAN SAUN MFG. & ENGR. CORP.**  
**120 Broadway** **NEW YORK**  
**CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS**



Combined Crane and Shovel

## Combination Crane and Shovel

One of the most modern combined utility machines for the contractor, supply yard, railroad or industrial plant is the improved crawling tread crane-shovel manufactured by the Orton & Steinbrenner Company of Chicago, Ill., and Huntington, Ind.

The machine is more than a crane—more than a shovel. The design is such that in a minimum amount of time simply by removing the crane boom and substituting the shovel boom and dipper, the crane may be readily converted from a clam shell rig to a steam shovel.

The radius of the boom instead of being fixed at a certain degree, may be varied to suit the conditions of the job. This feature enables it to dig several feet below the normal operating level and also increases the lift.

Motive power is supplied by only two engines, thus simplifying operations. The hoisting, swinging and traveling operations are performed with double clutches by the main non-reversing engines, while the crowding motion of the dipper is actuated by a separate reversing engine placed midway along the boom.

The rotating base turns on a live ring of rollers on a large diameter rail circle, thus evenly distributing the load and requiring very little power to swing.

The crawling tread is of the flexible type, adjusting itself automatically to the contour of the ground. The tread links are so designed that in passing around sprocket all foreign materials adhering to them are thrown off and prevented from entering the spaces between.

A feature of the machine is the accessibility of its parts, especially those bearing the brunt of the wear, consequently repairs when needed, can be installed in the field with a minimum amount of time lost.

Booklet describing this utility machine can be had by addressing the Orton & Steinbrenner Company, 608 South Dearborn Street, Chicago, Ill.

## Next Year's Catalogue

The Anderson Foundry & Machine Company, Anderson, Indiana, has already published its 1923 Catalogue on the Anderson oil engine, which is known as General Catalogue No. 12.

A most interesting feature of this catalogue is the comparative power cost chart showing graphically all the details of power cost on seven different types of power equipment. It is a most interesting study to anyone who has to do with power installation.

The catalogue itself is fully illustrated with halftones of the various types of engines made by this company, typical installations, etc. It is entirely free on application to the company.

A new catalogue has just been issued by the Brown Hoisting Machinery Company, on Brownhoist drop forged chain for conveyors and elevators. This catalogue will gladly be mailed on request, and those desiring copies will receive same by writing to this company at Cleveland, Ohio.

Turner Gravel Co., San Antonio, Texas, has been incorporated with a capital of \$50,000. Incorporators: P. Turner, L. Retlage, James Aitken



# After 51 Years of Service— “Just Like a New One Right From the Shops”

Bolted to a rough plank in the plant of the McKee Coal Company, Frostburg, Maryland, you will find this old Cameron Direct-Acting Pump.

Shipped from the A. S. Cameron Works on November 11, 1870 this Pump has already rounded out 51 years of service and is still in good condition.

After all these years of service the McKee Coal Company says—

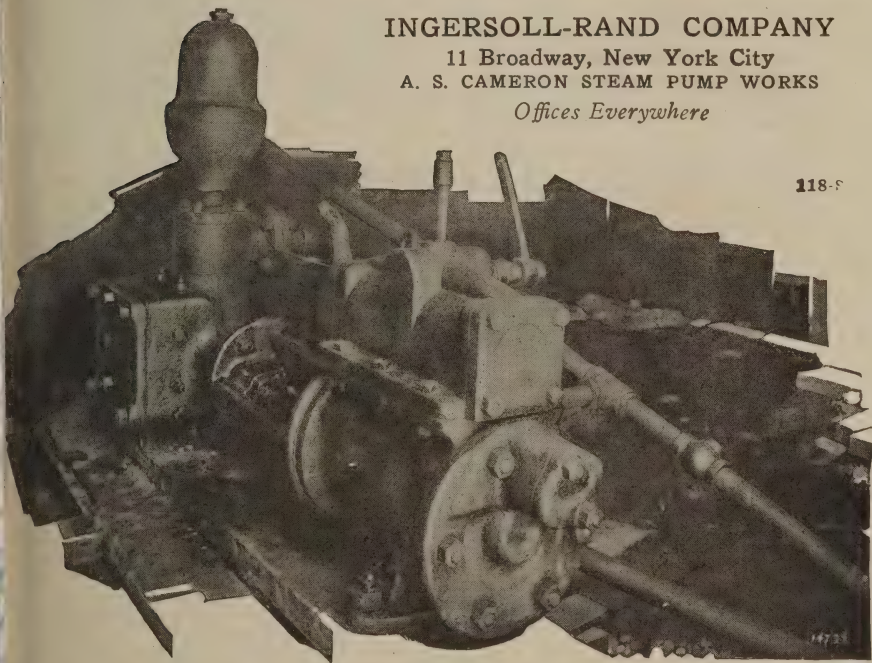
“We are pleased to advise that this Pump is working satisfactorily against a head of 150 feet and that there is nothing wrong or old in its actions whatever; works fine, **just like a new one right from the shops.**”

*Write for Bulletin 7304*

## INGERSOLL-RAND COMPANY

11 Broadway, New York City  
A. S. CAMERON STEAM PUMP WORKS  
*Offices Everywhere*

118-F



# Ingersoll-Rand



Loader Mounted on Truck

## Loader Mounted on Truck

Several truck loader elevators to be mounted on motor trucks have been furnished recently by George Haiss Mfg. Co., Inc. The combination gives great mobility and flexibility to the fast and efficient path-digging loader element.

The regular path-digger elevator is used, with double chain, toothed buckets and feeding propellers, so that no shoveling is required for a path into the pile for the loader. It is pivoted on standard A-frames over the rear wheels, to be collapsed while traveling. A two-way side discharge chute is provided at the top for loading on either side.

The elevator is driven either from the jack shaft, if the truck is equipped with one for a dump body, or by a separate engine. The latter plan is more expensive but more efficient, as the truck chassis can be moved while loading.

The capacity is 1 to 2 cubic yards per minute.

## New 4-Ton Locomotive

The Fate-Root-Health Company, Plymouth, Ohio, are placing on the market a new Plymouth gasoline locomotive known as Model CL, Type 2, weighing 4 tons, as illustrated. The points of superiority pointed out by the manufacturers are as follows:

Buda Engine, 4-inch bore, 5¼-inch stroke, rugged, powerful, heavy duty,

with large crankshaft, large bearings, removable cylinder head, heated intake manifold and full force feed oiling.

Extra large radiator with Modine sectional core allowing removal of section if injured without interfering with operation. Cooled by powerful 4-blade fan.

Improved telescopic coupling with sock absorbing provision between engine and transmission.

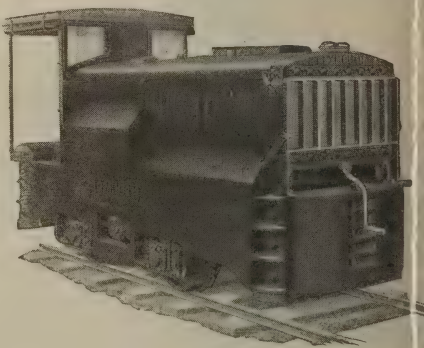
Drive or disc shaft carried in two bearings, relieving engine from all strains or stresses resulting from

one bearing shaft.

Double width chain on main drive affords large margin of strength.

Positive and direct flow of sand through steep angle pipes, with valve for each wheel acting as agitator also.

Heavy, rigid, re-inforced frame, with low hanging bumpers, affording protection to sprockets and chains, also



against wheels sinking between ties in case of derailment.

Greatest accessibility and simplicity throughout.

This size and type locomotive is used largely in quarries and gravel pits. The manufacturers will be pleased to mail descriptive performance bulletins upon request.

Moore Sand & Gravel Co., Boston, Mass., has been incorporated with a capital of \$36,000. Incorporators: William J. L. Roop of Melrose, Arthur H. Hall of Arlington and Arthur C. Moore of Watertown.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lim

VOL. 7

CHICAGO, ILL., JANUARY, 1923

No. 4

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**COMPLETE SERVICE PUB. CO.**

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**HARRY W. BAUMGARTNER**

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**D. J. HAUER, Associate Editor**

**J. J. FITZGERALD, Associate Editor**



*Conveyor installation of Moline Consumers Co.*

## This conveyor is lengthened 30 feet in one hour

**How the sectional Warren-Truss construction of  
Barber-Greene is used to cut gravel handling costs**

The photograph shown above illustrates a striking case of sectional extensions that mean a great deal in cutting both the necessary investment in equipment and the handling costs from day to day.

Although under-water gravel plants are not numerous, their use of the sectional features of Barber-Greene is of interest to all who have a material handling problem.

In this case the Barber-Greene is mounted on pontoons in thirty-foot sections.

The gravel is dug by a steam shovel, dumped onto a grillage, carried by the Barber-Greene to the shore, and there discharged upon another conveyor that carries it to the loading point.

As the floating shovel is moved from place to place the Barber-Greene is lengthened by floating into place additional thirty-foot sections.

Unbolting the old sections, unsplicing the belt, floating the new section into place, and rebolting and resplicing require only one hour.

Although the natural unsteadiness of the pontoons and the heavy load subject the Barber-Greene sections to exceptional strains, the Warren-Truss construction withstands the service successfully.

There are, of course, many other ways in which the sectional feature of Barber-Greene construction effects savings for the user.

For additional information send for our catalog "N" and our series of cost reports.

**BARBER-GREENE COMPANY**  
490 W. PARK AVE., AURORA, ILL.

# BARBER-GREENE

Portable Belt Conveyors

Self-feeding Bucket Loaders



# Pit *and* Quarry

Vol. 7

Chicago, Ill., January, 1923

No. 4

## What About 24-Hour Operation?

A FEW weeks ago PIT AND QUARRY sent to a large number of representative producers in the various pit and quarry industries a circular asking for an expression of opinion on the advisability of conducting operations in three shifts through the whole 24 hours. The letter asked also that the company give an account of any experiences it may have had along the lines of night operation.

To this letter we got a great number of replies. Hundreds of operators wrote in to us to let us know their experiences with night operation, or their opinion based upon a study of other peoples' experiences, or upon an abstract consideration of the subject.

Among producers of sand and gravel, of course, night operation was more in favor. The running of a dredging plant can be done much more easily than the safe and profitable operation of a stone quarry. But there were a few quarry operators, too, who could say that their experience with night operation was entirely satisfactory. By far the greater number of quarry operators, however, did not see anything in 24 hour operation to recommend it.

The chief objections raised to the plan by operators were somewhat as follows. It was expensive and unsatisfactory to conduct operations under artificial light of any kind. Too much time was lost when breakdowns occurred at night. This matter of breakdowns occurring at night and not fixed up at the time helped to hurt the day

production, by delivering broken machinery to the day shift. It was difficult to secure a force of men who would use at night the same care and energy that they used in the daytime. Unfaithful employes took unfair advantages when they were protected more from the supervision of the boss than they would be in the daytime. The day shift and night shifts were continually "passing the buck", one claiming that the other was to blame for certain injury to equipment, poor production, etc. One large producer of limestone tells us that he is so thoroughly convinced of the worthlessness of night operation that the crushing capacity of his plant has been increased at an expenditure of \$75,000 merely for the purpose of avoiding night work.

We find only a few whole-hearted supporters of night operation. One of these, the Gottron Brothers Company of Fremont, Ohio, say, "We have found that our night crushing has cost us very little more per ton than our day crushing. I would not say to exceed eight to ten cents per ton additional, and it really has saved us almost this amount due to the fact that our trucks were not held up." All of the Gottron Brothers Company trade is by truck, and they operated at night in order to keep stone ahead of the trucks, which worked both day and night with two shifts of drivers. Their bins are not of large enough capacity to keep stone ahead of the trucks so that they were actually forced into

night operation. In their case, however, the experience seemed to be satisfactory.

The Daniel Evans Stone Company of Marion, Ohio, also appear well satisfied with results from night operation. They say, "We have for the past five years, run practically on the twenty-four hour basis from six to eight months of each year. We find this to be very satisfactory and the output ranges from eighty to ninety per cent as much as the day output. We have lighted our plant, tracks and shovels with electricity and wish to say that, during the summer months, it is much more pleasant to work at night than at day. We have quite a task to keep the day men from working at night."

A number of operators drew attention to the fact that the power was better at night. This, of course, is true only in districts where the chief demands on the local power house are for industrial purposes, and are consequently made principally during the day-time.

The Chickamauga Quarry & Construction Company of Chattanooga, Tenn., are quite well satisfied with night operation also, and say that "We have been operating night shifts since April of this year except during period of acute car shortage. It has proven very profitable to us. Our cost of production has been greatly reduced as follows: We use electric power under usual contract for same. The entire increase of power used by night shift is, of course, charged for at cheap rate, this reducing power cost per ton from 40 to 50 per cent. The overhead expense, owing to increase of output is decreased proportionally. Night work also enables the operator to double his output during the rush season without any increase in his investment."

The Beaumont Building Material Company of Beaumont, Texas, regard

the fact that repairs are not made at night as a very distinctive advantage and say "It may be surprising to you that our night operations are more successful from a production standpoint than the day operations. Our observation, however, has been that this is accounted for by the fact that, being much harder for difficulties to be overcome and repairs to be made at night, that the night crew leaves all these things, if it is at all possible, for the day crew to worry about, especially as regards the stepping-in of additional discharge pipes or replacements of worn parts, etc."

The obvious advantage of decreasing the overhead cost per yard or ton of stone produced was mentioned by quite a number of operators. This, of course, is the first advantage a man would see in planning night operation.

Below are given a number of opinions by representative producers from all parts of the country.

*Foster & Creighton Co.,  
Nashville, Tenn.*

In reply to your favor of December 11th, beg to advise that it has been our experience that night work in a quarry is very expensive and inefficient.

*Moraine Gravel Co.,  
Plymouth, Wis.*

We did not find it profitable for us, owing to the difficulty in lighting the place sufficiently to watch the machinery as it should be looked after, thereby causing many breakages.

*Menantico Sand & Gravel Co.,  
Millville, N. J.*

Because the night shift is prone to have undone little things that keep the plant at top notch production, our experience has been that in using the night shift our cost of production for the material produced over what would be produced by the day shift is increased just about 100%. That is, if we averaged 2,000 tons per day on one shift, the two shifts would only give us an average of about 3,000 tons at practically double the cost.



*Goodwin-Gallagher Sand & Gravel Corp.,  
New York City.*

We have tried this on several occasions and have not found it satisfactory either as to cost or production.

*The St. Paul Stone Quarries Co.,  
St. Paul, Ind.*

We have had some experience with the 24-hour shift and find it very desirable for summer operation only. In our case the production cost for night was practically the same for day operation as almost all the machinery was in use at night that was in use during the day.

*Consumers Company,  
Chicago, Ill.*

The operation of a plant on a twenty-four hour basis is somewhat more costly than a daylight basis. We have tried it several times and have found that unless considerable money is spent in the nature of permanent lighting fixtures, costs at night are very high. As a temporary measure I would say that almost universally it is a failure, but if a company wishes to operate a plant at night for some time and is willing to make the necessary installation and safe-guards, it can be done at a slightly higher cost than the day operation. My experience has been that accidents both to men and equipment are much more frequent at night than in the day time and unless it is impossible to get away from night operation, I am always much disposed to do so.

*Eau Claire Sand & Gravel Company,  
Eau Claire, Wis.*

We have found night operation to be profitable for these reasons: 1. increases income without increasing general overhead, therefore decreases unit cost of product. 2. Makes it possible to take advantage of peak demand at certain seasons of the year, and is still more profitable if stock-piling facilities are available. 3. Makes it possible both for large and small producer to give better service during periods of high demand by having material ready to load out. 4. Frequently due to plant arrangement truck delivery business interferes more or less with the loading of railroad equipment, and by the proper organization of production and loading this can be partially remedied by night operation. 5. During the hot weather night crews will invariably

get out more material than the day crews, due to cool nights, etc. 6. Machinery will operate to better advantage at night due to lesser heating effects. Some of the disadvantages of night operation are: 1. On account of difficulty of thoroughly illuminating plant and operation breakdowns are more apt to happen, accidents to employees take place oftener, all of which increases expense. 2. The necessity of two different crews, both with same responsibility of care of equipment, etc., frequently causes friction; but this same situation can be easily used to advantage by bringing about competition in quantities produced by two shifts. If 20-hour per day operation is carried on over several months, great care must be used to give thorough inspection to machinery at more frequent intervals, and more spare parts must be kept on hand than during 10-hour day operation. Double units throughout plant are a decided advantage in 20-hour operation.

*Lake Erie Limestone Co.,  
Hillsville, Pa.*

The only time when we have found night operation profitable is when labor is plentiful. The reason for this is that it is very hard to give a quarry operation close supervision after dark on account of the territory it covers and there is ample opportunity for any man to shirk his work. We estimate that our average night operation costs us about 15% to 20% more than daytime operation. With us a mad feature of night operation has been that very often breakdowns which occur at night cannot be repaired until the following day, and in this way our day light production is curtailed. Of course, this could be eliminated to a great extent by maintaining a regular mechanical or repair gang at night. This we have never done.

*The Bessemer Limestone & Cement Co.,  
Youngstown, Ohio.*

. Operation at night costs as much money as day operation, but production is generally about two-thirds of day operations. Thus the unit cost, insofar as night operation is concerned, is higher than that obtained during the day. We never do night work except under pressure.

*Champion Gravel Co.,  
Marquette, Mich.*

We found that we could not do quarry work to advantage at night ex-

cept loading into cars in the quarry and crushing. The great disadvantage of night running was that there was not time for repairs and this necessitated the closing of the plant for repair work, which would ordinarily be done over time.

*The Weston & Brooker Co.,  
Columbia, S. C.*

We have been operating two 8-hour shifts, the last shift running until 12:30 at night for about two months. We believe that the night operation is entirely practical, as the same has been satisfactory during the past two months.

*New Inland Gravel Co.,  
Hattiesburg, Miss.*

The greatest advantage which we derived by night operation was the perfect power service. During the day our local traction company was barely able to supply the different industries which are electrically operated, and we often had from one to two hours delay on account of our pipe line becoming choked when the power would be cut off when the pipe was carrying a heavy load. We were able to load from one to three cars more at night than during the day, with no delay during the day.

*Coon River Sand Co.,  
Des Moines, Iowa.*

We provided an abundance of lights, and the night crew started to work before dark so that they had an opportunity to see everything in its place before darkness came on. So many mistakes were made that we found a better way of increasing capacity. We found it more economical and much more satisfactory to increase the capacity of the plant so as to be able to handle all business in day light hours.

*Columbia Quarry Co.,  
St. Louis, Mo.*

We have tried this during two seasons and it is a great disappointment. On the face of it, it appears to increase profits, but the net result is a loss. We are so thoroughly convinced of this that we are increasing our crushing capacity, at the expenditure of \$75,000.00, just to avoid night work.

*Bethlehem Mines Corp.,  
Bethlehem, Pa.*

We do not believe from our experience that a 24-hour operation is desirable unless it can be inaugurated and carried forward continuously over long periods of time. Our reason for

this belief is that shovel crews, locomotive crews, and, in fact, all men employed on night work are not as efficient as those employed on day work and there is too much tendency on the part of shovel men and locomotive men to neglect the repairs that should be taken care of daily and to put the blame over on the other shift.

*Thomasville Stone & Lime Co.,  
Thomasville, Pa.*

We have figured that the machinery needs rest practically the same as the employees, also that the same should have some time off in order to make the necessary repairs. This, of course, could be overcome by duplicating the machinery on your entire plant. The production we have found falls much below the day production. The reason for this is hard to explain unless unfaithful employees, some of which every plant employs, take advantage during this time.

*White Marble Lime Co.,  
Manistique, Mich.*

We have never found it as economical in our final costs to operate this extra shift as we could take care of this business during the day. However, if the condition warrants it, very satisfactory results can be obtained.

*Granite Sand & Gravel Co.,  
Indianapolis, Ind.*

We find it impossible to secure a force of men who would use the same care and put the same energy in their work, we are able to get in daylight. We figure that our cost of operating is at least 20% higher at night than during daylight.

*Chicago Gravel Co.,  
Chicago, Ill.*

We have always figured that a night run very materially reduced a day capacity. We have utilized all sorts of lighting devices from electrical power installed in the plant to numerous kinds of acetylene lights, but the best experience we have ever had has probably been in two 8-hour daylight runs, and this is only possible in long summer months.

*The France Stone Co.,  
Toledo, Ohio.*

It has never been successful in our minds caused by several different reasons. We feel that we can produce as much stone at a considerably lower cost during a twelve or fourteen-hour operation on the basis of one shift than can be done with two shifts of approximately ten hours each.



*W. J. Sparks Co.,  
Mt. Vernon, Ky.*

Some eight years ago, we did run our Mt. Vernon plant at night and we used electricity for lighting up the plant and quarry. It enabled us to increase our output to meet an emergency demand but we did not find it satisfactory. We should not advise night operations if it can be avoided as they will not add anything to profits. Increase day force and plant to take care of demand or let some one else have the business.

*The Hahn Muscatine Company,  
Muscatine, Iowa.*

Our day crew worked ten hours while the night shift worked eleven, and while we kept no strict account of the operating costs, we are of the opinion that the night crew produced more material per hour than was the case with the day crew, part of this being due to the fact that at night there is not so much to see and thus detract the attention of the help and at night we had the benefit of *better power* than the day crew, since not many industrial plants operate nights in this locality, the power at our plant being electricity.

*E. J. Reynolds Sand Company,  
Utica, Ill.*

The operation of our washed and dried sand plant at night cost very little in excess of our day shift as it requires only the additional steam to operate the small upright steam engine to drive our generator, this with the slight overhead costs, such as light bulbs, wiring, etc., is comparatively small and does not increase the cost of production over two or three cents per ton.

*The Island Sand & Gravel Co.,  
Columbus, Ohio.*

A night shift, as a very general rule, is but a temporary makeshift, does not take the same interest in its work, does not know when it is

going to be laid off; the good men from the day crew, from which the night shift is organized go on with reluctance, feel grieved that they have been selected, or as they feel, "discriminated against," etc.

*Universal Sand Company,  
New Castle, Pa.*

We do not think it would be good judgment to do so. There are so many things which can happen to a sand and gravel operation at night which cannot be adjusted until daylight that we feel that it would not be a profitable venture.

*New Ulm Stone Company,  
Mankato, Minn.*

We find that we have a great deal of repair work, which is made necessary and when operating to an excess of ten hours a day does not give us time to keep our machinery and crushers in proper working condition and we figure the only advantage that we have gained is a matter of giving service to our customers rather than in creasing the profit of our operation

*Whiterock Quarries,  
Bellefonte, Pa.*

The only night work we do is the firing of our kilns. We do not keep any account of the difference in the costs of firing at night as compared with daylight operation, but we imagine that we do not get as good results for the reason that we do not keep a man over the firemen, but trust to their honesty to do their work properly and, of course, some men slink their work.

*Texas Trap Rock Company, Inc.,  
San Antonio, Texas.*

If the material is trap rock, tell him to let it alone. The added repairs (plus ordinary night troubles) from handling this class of rock made night operation of no gain to ourselves. But we believe a plant crushing limestone might do it with advantage.

# Complete Pulverizing Plant in 6 Weeks

A FINE example of a good plant built in record time, is that furnished by the new pulverizing plant of the Waukesha Lime and Stone Company, at Waukesha, Wisconsin. A few months ago that part of the company's mill in which the production of the small-sized and pulverized stone was carried on, was almost totally destroyed by fire, leaving the company entirely without pulverizing facilities at this point, and necessitating the construction of an entire new plant. An amount of machinery was salvaged from the wreckage of the old operation, and as soon as a start could be made, steps were taken toward reconstruction.

From the time that the first structural work was begun, until the plant was producing pulverized material, was only a matter of six weeks, a length of time so brief that many operators would have despaired of bringing the work to anything like completion. New machinery had to be secured, structural material ordered and "waited for." This last operation, that of waiting, really constituted an important factor in the progress of the work as evidenced by the loss of time suffered while the company waited for the delivery of a number of carloads of lumber.

The work was done entirely by the company's own men, under the supervision of Mr. Wolf, superintendent of the company's stone and gravel operations at Waukesha. Mr. Wolf is an experienced plant builder and this possibly accounts largely for the speed with which the structural work was carried through to successful completion.

The building itself is of corrugated steel construction with concrete wall and machinery foundations, and arranged as nearly as possible for the

progress of the stone in a straight line from the time it is received in the plant to the time it goes into cars or storage.

The first bit of equipment employed in the processing of the stone and the one which the visitor will naturally consider the most interesting feature of the plant, is a steel belt conveyor that carries the crushed material from the crushing plant to the drying and pulverizing building. This belt is a product of the Sandvik Steel Company, Woolworth Building, New York City.

As will be noted in one of the accompanying photographs, the crushing and pulverizing plants are connected by an enclosed bridge which serves as a gallery for the steel belt, and as a walkway between the two buildings. Through this gallery runs the steel belt 150 feet between centers, this distance being that between the crushed stone bin where the material is picked up and the dryer at which the belt discharges. Over this distance the belt, a flat band of steel 16 inches wide by .035 inches thick, travels at a rate of 100 feet per minute, handling at this speed 30 tons of stone per hour.

It is rather a strange sight to a man used to troughed fabric belting to see this flat band of steel running along smoothing without guides at the side and preserving its alignment by its own means that, while quite simple, does not readily suggest itself to a casual observer.

Idlers are spaced approximately six feet on the upper roll and approximately 25 feet on the lower roll. Each set of idlers consists of two 6x4 pulleys and a 1 3/16 inch shaft running on trunnion bearings. The end and head pulleys are 40 inches in diameter and 12 inches in width. The belt, which is 16 inches wide, really runs on only





Partial view of Pulverizing Plant Addition to crushing plant of Waukesha Lime and Stone Co.

the middle 4 inches of the pulley's 12 inches of width, the sides tapering off slightly so that they do not touch the belt. Herein lies one of the secrets of the belt's successful operation. A little thought on the subject will show how the belt thus automatically keeps itself properly aligned.

The whole conveying device is operated through gear and chain device by a 10 horsepower motor. The Waukesha Lime & Stone Company is standardizing on 10 horsepower motors, and the style of drive used, together with the speed of the belt and other factors, were influenced to an extent by this standard.

It was originally intended to use a magnetic tail pulley to pull out any tramp iron that might injure the pulverizer, which is used at a later point in the process. It is practical, by the way, to use a magnetic separator with a steel belt although this may seem strange on first consideration. Second

thought, however, on the matter of the application of the magnetic separator at the tail pulley, proved best, and a self-contained magnetic separator was placed between the bins and the pulverizer. This provided a much better location for a magnetic separator by reason of the fact that this arrangement will take care of any iron that might possibly come from the dryer itself or from the bins or elevator. In other words, it performs its office on the stone just before the time that the stone enters the machine that would be injured by tramp iron.



Sixteen Inch Sandvik Steel Conveyor Belt, showing Discharge End.



Stone Passes Successively Through a Dryer, Elevator, Pulverizer, and Tube Mill.



End Pulley of Steel Conveyor Belt, Loading Spout at Right.



Mr. Wolf and Mr. Halvorson. Power Control Board in Background.

The steel conveyor belt discharges above a rotary dryer 60 inches in diameter and  $46\frac{1}{2}$  feet in length. The stone, after passing through this dryer

and being thoroughly freed of any moisture, drops at the foot of a 20-inch bucket conveyor, 28 feet between centers, which discharges into a hopper above the magnetic separator. This last is, as previously mentioned, a self-contained device and includes the magnetic pulley and tail pulley of the same diameter, and a short length of rubber belting. It is product of the Dings Magnetic Separator Company of Milwaukee, Wisconsin.

After the stone has passed over the magnetic pulley and any metallic matter has been removed, it goes to an Allis-Chalmers No. 2 pulverator, which reduces it to a size that contains all the finenesses except that produced by the tube mill later in the process. This pulverator discharges at a vertical elevator  $41\frac{1}{2}$  feet between centers and 16 inches wide, feeding two double-decked Hummer screens made by the W. S. Tyler Company of Cleveland, Ohio. These screens are arranged in series, the second screen rescreening the rejections from the upper deck of the first. Thus are pro-

duced five sizes running from chicken grit or coarser, to the finest mesh material that the company manufactures, with the exception of its 85



through 200 mesh, produced by the tube mill.

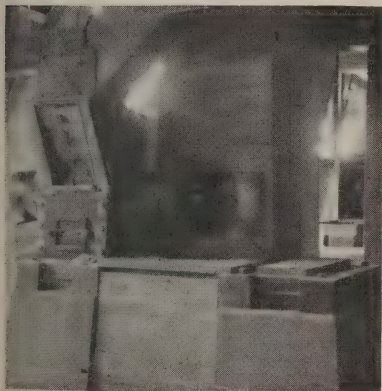
The tube mill operates from the finest grade of material produced by the first screen. This machine,



Loading Spout for Steel Belt Conveyor.

manufactured by the F. L. Smidth Company of New York City, will efficiently produce pulverized material, 85 per cent of which will pass a 200 mesh when the mill is operated to secure an output of 12 to 14 tons per hour.

The product of the tube mill is taken up by an elevator which conveys it direct to a bin at the height of the

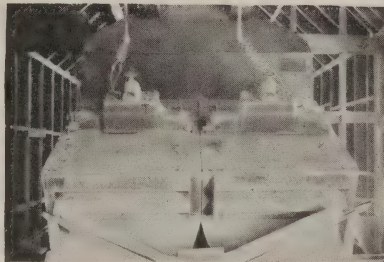


Stone is Reduced by an Allis-Chalmers No. 8 Pulverator

other bins in the plant. This bin, which holds the tube mill product, feeds into a Bates valve bag packer. The other bins are drawn off at the bottom through 6-inch iron pipes in

each of which a slide, located at the lower part of the pipe near the loading floor, cuts off the flow of material. These coarser sizes are put up in jute bags which are filled with the help of a home-made device that may be set on any one of the pipes. This device consists essentially of a revolving bag rack, with four compartments which permits a number of men to keep working continuously.

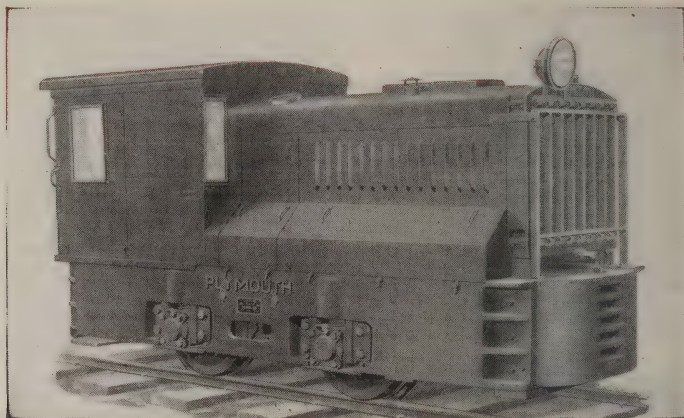
Running through the loading floor to the coarser material and by the Bates packer, is an adjustable belt conveyor that will carry material to the cars or to the point where it is passed on to the bag storage. Ample space is allowed for storage.



Material is Screened by Hummer Vibrating Screens.

A notable feature of the plant is its power control, shown in part in one of the photographs. On it are mounted the Allis-Chalmers motor starters and controls for the magnetic separator and other devices, and a number of Square D switches which are employed wherever there would ordinarily be knife switches.

This new plant, which has a capacity of 300 tons per 10 hour day, is running smoothly in every respect and it is the expectation of the management that the operation there will be very profitable. Members of the managing body of this concern who are well-known to crushed stone operators through their activities in association affairs, are Mr. H. M. Halvorson, manager, and Mr. John Sloan, secretary.



## *Announcing the Plymouth*

No part of an Industrial Locomotive is of more vital importance than its Transmission. No matter how good or powerful the Engine or Power Plant all power must be transmitted through the Transmission. It can be either the strongest or weakest link.

When we designed the 7 ton, 4 speed Plymouth Gear Drive Locomotive we gave the Transmission our first consideration. We have spent **years** in the study and experiment of transmissions. Not until after long, hard and grueling tests in actual road work—tests that showed this Locomotive would develop and maintain a drawbar pull of 5250 lbs. on sanded rail—were we satisfied with this transmission.

There must be reasons for this remarkable performance. There are.

1. Transmission has exclusive feature of a final driving gear and shaft house in the gear case compounding the ratio of the other gears.
2. All Gears unusually large and massive, final driving gear being  $14\frac{1}{2}$ " diameter by 4" face. Other gears 2" and  $2\frac{1}{4}$ " face of large diameter.
3. All Gears made of alloy hardened steel, mounted on extra heavy shafting and ball bearings.

# PLYM

*Gasoline*





## *Speed Gear Drive Locomotive*

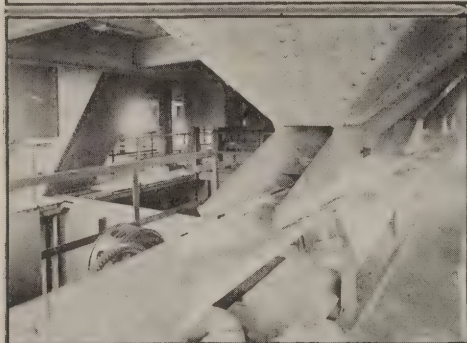
4. Gears that are driving are the only ones in mesh.
5. No Jack Shaft required.
6. No Jaw Clutches.
7. Driving Sprockets on same horizontal plane with axles.
8. Only two short Drive Chains—both extra heavy.
9. All Ball Bearings inside of Gear Case, from which they are lubricated.
10. Clutch has nine driving discs faced on each side with non-burnable facings. Very smooth in action.

Plymouth Gear Drive Locomotives are not an experiment. They have been tried, tested, and proved. They are at work in road construction, quarries, sand and gravel pits and industrial plants—and the numerous repeat orders attest the exceptional service.

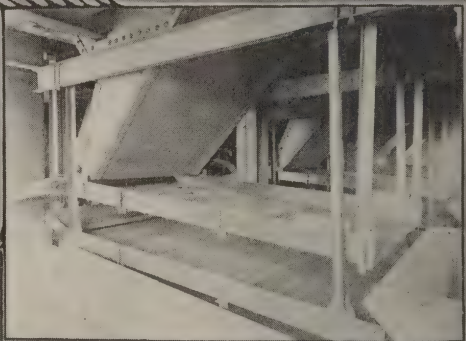
See the Plymouth Gear Drive at the Good Roads Show, Chicago—or write for literature.

**THE FATE-ROOT-HEATH-CO., Plymouth, Ohio**

**PLYMOUTH**  
*Locomotives*



Views of  
the New Marblehead, O. Plant  
of the  
Kelley Island Lime  
and  
Transport Co.





## World's Largest Combined Crushing and Flux Plant

**T**HOROUGHLY in keeping with their position as leading producers of limestone products is the latest development of the Kelley Island Lime & Transport Company at their Marblehead, Ohio quarry, where they have in process of erection a new crushing plant, which, both in size and in excellence of arrangement and construction, marks a notable achievement in the pit and quarry industry.

The Kelley Island Lime & Transport Company have operated the Marblehead quarry for a number of years, the principal output being flux stone and kiln stone for lime manufacture. In addition to these main products they are also producing agricultural limestone and commercial grades of crushed stone.

The high quality of the rock and the very favorable position of the deposit, located as it is, adjacent to the leading steel making and industrial center of Ohio, and possessing facilities for both rail and water shipment, have been important factors in the building up of a huge volume of business, a volume which has outstripped the original facilities for production and rendered it imperative that the capacity and all around efficiency of the operation be raised to the highest standard.

Quarry operators and engineers who are familiar with the multiplicity of questions that arise in connection with even the simplest quarry and crushing plant development will appreciate the magnitude of the problem

that faced the officials of the Kelley Island Company and the engineers who cooperated with them in the designing of a combination flux and commercial crushing plant of 1,250 tons hourly capacity.

The description which follows of the new plant now rapidly nearing completion is "prima facie" evidence that the problem was solved in a most impressive and, withal, a beautifully simple fashion. Problems incident to the selection and arrangement of the plant equipment, building construction, plant location, etc., were approached in a thoroughly painstaking manner and the company officials spent considerable time in visiting several of the large operations in different sections of the country for the purpose of inspecting the various types of equipment in service at these quarries, and arriving at a fair and unprejudiced decision as to the best machines for their own requirements.

Among the objects to be accomplished were the following, which have never been sacrificed since the first plans were discussed:

- 1—Safety of workmen employed.
- 2—Production of stone in large tonnage of merchantable prod-



Section of the Marblehead Quarry, Showing Sandusky Bay in Background.

ucts meeting the most exacting requirements of the consumer.

- 3—Continuity of operation to insure the trade against interruptions in the steady flow of material to points of consumption.
- 5—To provide facilities permitting utilization of full carrying capacity of railroad freight cars.
- 6—A compact plant, meeting local conditions, and permitting closer supervision.

The Marblehead, Ohio, quarry of the Kelley Island Lime & Transport Company has for years been known as one of the largest in the country. Before crushing machinery and steam shovels came into use for stone quarry operation, there were over 1,000 men employed in the quarry breaking and loading stone by hand. The company early resorted to labor saving machinery and first installed a No. 6 gyratory stone breaker, having a capacity of from 300 to 400 tons per day. This crusher, as well as others was soon outgrown as is indicated by successive installations of Numbers 7½, 8 and 9 gyratory breakers, three of the latter being in service

at one time. Later a 6 foot x 7 foot Edison roll crusher was installed and this machine carried the burden of the production required during the late war. Obviously, such fast growth of the business resulted in the rebuilding of plants several times and in ways that would least interfere with continuous production of increasing tonnage, and the old frame structures, originally designed for low tonnage machinery, began to show the strain of the vibration and racking of the heavier machinery which was later installed, and at the end of the war it seemed only wisdom to provide a new plant, built substantially and designed and arranged to meet the future productive requirements.

The quarry is opened up over large areas giving a working ledge three and one-half miles long. The top or first ledge is worked from 22 to 25 feet deep of very uniform analysis and thinly stratified natural fluxing stone.

The total quarry land consists of 3,000 acres, of which 400 acres have been quarried, leaving 2,600 for future operation. The over-burden is light, usually not over one foot deep and consists of a light loam, this being removed by 3 Thew traction stripping shovels. In an operation of this size

the disposition of stripping and by products from the crusher becomes a serious problem, both as to location of property on which to dump the material, and the expense of handling it. At Marblehead, land which has been quarried out, is being filled with the by-products and covered with the stripping, thus reclaiming the land and making it into excellent farm property.

Drilling of the stone



Two of the Four 48 inch by 20 foot Closed End Screens in the 24K Crushing Plant



is done with 8 well drills. After shooting, the quarry face is worked with 10 heavy type railroad steam shovels and one 100 ton shovel mounted on caterpillar trucks, the latter being a very recent installation accomplished by packing the caterpillar trucks under a shovel which formerly was mounted on railroad trucks. It is believed that this is the first attempt to use the caterpillar trucks for moving heavy duty steam shovels in quarry operations and the results are being watched carefully by officials of the company and by many others who are interested in progressiveness in stone quarries. The shovels and crusher are now served by 21 miles of 36 inch gauge railroad, on which 31 Shay geared locomotives with 360 two-way side dump cars are worked. The new plant is equipped for both standard and quarry gauge tracks, requiring several miles of new tracks and additional railroad equipment, although by having all quarry tracks from the shovels to the main crusher built practically without grades, it will permit of increasing the number of cars per train over the number now hauled.

In the selection of the proper type of initial breaker for the new crushing plant, all of the types in use at the present day were considered, but the problem quickly narrowed itself down to a consideration of the respective merits of the gyratory and the Edison rolls. The Kelley Island Company is thoroughly familiar with both of these types from first hand operating knowledge. The primary crusher in the old Marblehead plant is a set of 6 foot x 7 foot Edison rolls whose operation, from a mechanical standpoint, has been entirely satisfactory over a period of some years. The gyratory crusher was finally decided upon.

A decision corollary to the type selection and one which will be equally interesting to the student of crushing plant design, was that of installing two

primary breakers instead of one. Realizing the wisdom of the homely proverb, anent "putting all one's eggs in one basket," the company concluded that the two unit installation would be a very effective measure in reducing the loss of time and production resulting from breakdowns, while at the same time the high capacity required warranted them in putting in units large enough to handle shovel loaded rock without excessive bridging and blocking in the receiving openings.

The No. 24 Allis-Chalmers gyratory breaker, having receiving openings 47 inches x 125 inches in size and capable of exceeding the required average capacity by an amount which will easily compensate for irregularities in train service, was selected as the best size for the purpose.

The two No. 24 crushers are located side by side in a large concrete lined pit, with their tops 10 feet below the feed tracks which run through the crusher house at grade. There are two of these feed tracks, one on either side of the crushers, and the crushers are spaced so as to permit the simultaneous dumping of six ten yard side dump quarry cars, three on each side. This arrangement, while it necessitated a large expenditure for excavation and foundation construction, was decided upon as being the only practicable arrangement to handle the tonnage desired. It will permit the continuous passage of trains through the crusher house on both sides of the big crushers, each and every train being intact at all times, with none of the time loss and dead equipment loss which attend the operation of the older type of incline-fed plant.

It is obvious that the operating economies effected by the "subterranean" installation will quickly repay the additional initial investment in a plant having the capacity that this plant has.

The receiving hopper above the crushers is a big steel box, the stone being permitted to form its own hopper. The upper edges of the hopper on the sides adjacent to the feed tracks are chambered back to the rail to prevent the piling up of such fine material as may drop from the cars close to the rail when the load is dumped.

Dumping of those cars which do not balance toward the receiving hopper will be accomplished by air cylinders so arranged that their pistons will rise against the car body from beneath when the air is applied.

Each No. 24 crusher is driven from a 200 horsepower, 720 r.p.m. slip ring motor through an English system rope drive, comprising 26 turns of  $\frac{3}{4}$  inch rope. A description of the control of these motors, as well as the other motors throughout the plant, will be found under the subject of power.

The crusher pit, which extends 39 feet 9 inches below ground level, is heavily lined on its four sides and bottom with waterproofed concrete and is provided with an ample sump for catching any seepage which might occur. This sump is fitted with two vertical shaft motor driven centrifugal sump pumps equipped with automatic float switches. Either of these pumps is of sufficient capacity to easily take care of the anticipated seepage, the duplicate installation being merely a safeguard against the possible breakdown of one unit.

An electrical bridge type traveling crane, with a lifting capacity of fifty tons, spans the crusher house about 43 feet above the top of the crushers. This crane will handle the heavy crusher parts when making repairs or replacements and will also be used for breaking bridges and blockades in the receiving openings.

It is natural that the two unit initial breaking plant should be followed by a strictly two unit plant through-

out and in this plant the two unit idea has been carried out with a completeness that has been emulated in only one or two preceding installations in this country.

Each No. 24 crusher discharges directly into a 72 inch pan conveyor which carries the material up a forty-five degree incline into the top of the screen house, the head shafts being located about 88 feet above ground level. These huge conveyors are 176 feet long between centers, a length which exceeds by a considerable margin anything hitherto attempted in pan conveyor construction.

A feature peculiar to this type of elevator is the great weight of the machine itself as compared to the live load which it is designed to handle and this feature, entailing as it does enormous weight and consequent high chain and head gear stresses, has in the past militated against the use of pan conveyors of over 130 foot centers.

In order to overcome this objection and to permit the installation of pan conveyors long enough to fit in with the balance of the plant design, which embodied the severe combination of crushers below grade and extremely high screen house, a most ingenious device has been resorted to in the form of an equalizing device located in the conveyor trestle about 65 feet below the head shaft. This device is designed to carry the entire dead load of the conveyor up to the point at which it is installed, leaving the upper 65 feet of dead load, plus the live load to be carried by the head shaft. This contrivance constitutes "something new under the sun" in pan conveyor design and its conception has made feasible the employment of pan conveyors of a length that was heretofore considered utterly impracticable.

Each pan conveyor is arranged for individual drive from a 200 horsepower, 720 r. p. m. slip ring motor through silent chain drive and speed



reducing gearing. Powerful automatic devices are provided on each head shaft to prevent the backing up of the conveyor in the event of power failure when they are under load.

Repairs for the head shaft and driving mechanism will be handled by a five ton bridge type overhead crane arranged to serve both machines.

Each 72 inch pan conveyor discharges directly into two 60 inch by 4 foot steel frame closed end Gates revolving screens arranged in a parallel battery. Each of these screens



one of the No. 8 Reduction Crushers is geared direct to a 25 horsepower, 20 r. p. m. slip ring motor. The first 12 feet of each screen barrel is fitted with tank steel sections having 6 inch round perforations. Surrounding these sections is a 10 foot jacket of the same material having  $2\frac{1}{4}$  inch perforations. The remaining 12 feet of the barrel is fitted with sections built up of strap steel laid crosswise and riveted at each intersection. These traps are spaced to give a 6 inch square opening. The material passing through these 6 inch perforations, combined with the minus 3 inch plus  $\frac{1}{4}$  inch material rejected by the jackets will constitute the finished flux and

will be chuted to the proper storage bins below the screen rooms.

The minus  $2\frac{1}{4}$  inch material passing through the jacket perforations will pass into a second battery of four 48 inch by 20 foot steel frame closed end Gates revolving screens located below the 60 inch screens. These secondary screens are also arranged for geared drive from four 20 horsepower, 720 r. p. m. slip ring motors. It is here that the separation of the various commercial sizes begins. The screen barrels are fitted for their entire length with tank steel sections having  $1\frac{1}{2}$  inch round perforations and each screen is equipped with a 10 foot dust jacket having  $\frac{7}{8}$  inch perforations. The clean minus  $2\frac{1}{4}$  inch plus  $1\frac{1}{2}$  inch and minus  $1\frac{1}{2}$  inch plus  $\frac{7}{8}$  inch sizes made by these screens is chuted to the storage bins as finished product.

The minus  $\frac{7}{8}$  inch stone passing through the 48 inch screen dust jackets will go to four 5x10 foot double deck shaking screens. Each of these screens is arranged for individual drive belt from a 10 horsepower, 720 r. p. m. squirrel cage motor suspended from the joists of the 48 inch screen floor above. Both decks of these shaking screens are fitted with wire cloth, the upper deck having  $\frac{5}{8}$  inch openings and the lower  $\frac{3}{8}$  inch. Here again the finished minus  $\frac{7}{8}$  inch plus  $\frac{5}{8}$  inch and minus  $\frac{5}{8}$  inch plus  $\frac{3}{8}$  inch stone is distributed by gravity to the proper bin compartments.

A 20 inch belt conveyor gathers the minus  $\frac{3}{8}$  inch material from all four screens and discharges it to a second 20 inch conveyor which in turn discharges to a vibrating screen which separates the material into  $\frac{3}{8}$  inch,  $\frac{1}{4}$  inch and dust, this constituting the final separation into commercial grades.

Having followed the commercial screenings process through to its conclusion we will return to the treatment of the oversize material rejected

by the initial battery of 60 inch screens.

This oversize product, which will run from 8 to 10 inches in size, will be used for kiln stone for lime manufacture, the Kelley Island Lime & Transport Company being a leading producer of the latter commodity.

Realizing however, that the production of oversize will at times exceed the demand provision has been made for reducing this rock to flux size and under in two No. 8K Gates gyratory crushers located in the screen house, with their tops 10 feet below the discharge end of the 60 inch screens. The rejection chutes from these screens are so arranged that the rock can be dropped into the crushers or by-passed to the oversize storage bins as occasion may require.

The No. 8 crushers are so located that each one of them will receive the rejections from two of the battery of four 60 inch screens. These crushers are belted up to 75 horsepower, 720 r. p. m. slip ring motors.

A 15-ton crawl over each machine will serve them for repairs and adjustments, the crawl beams being extended outside the building to facilitate the hoisting of heavy repair parts from the ground.

The No. 8 crusher discharge into two No. 8 belt and bucket elevators, 51 feet long between centers. These elevators pass up between the two pairs of 60 inch screens and discharge into these screens, thus closing the circuit and insuring the reduction of all material to flux size and under when desired.

The elevators are equipped with steel frames and are geared direct to two 20 horsepower, 720 r. p. m. motors.

The storage bins under the screen house are divided into 32 compartments having a total active capacity of approximately 4,600 tons. The bins span 5 loading tracks, 4 of which are equipped with track scales for weigh-

ing the cars as they are loaded. This arrangement of track scales beneath the storage bins is believed to be unique, applied as it is to so many loading tracks.

These scales are of the latest design and comply with the requirements of the American Railway Association and the recommendations of the U. S. Bureau of Standards, providing the most accurate and dependable facilities for weighing cars as they are loaded. The question of accuracy is taken care of to such an extent that customers may feel safe that they will receive the full amount of material for which they are invoiced, thus eliminating the cause of complaints regarding shortages, and the friction between the shipper and the consumer caused by such controversies. Another deciding factor in connection with such an elaborate system for weighing was the question of car supply. Car shortages affect all shippers, but none more than the quarry operators. When the railroads of the country were making a drive for intensive loading of equipment, an analysis of car loading was made. This disclosed the fact that cars could only be loaded to full carrying capacity by weighing them as they were loaded and that by utilizing the full capacity it was possible to increase the average load to an extent that permitted the shipment of tonnage equivalent to 3,200 extra cars in 12 months without asking the railroads to increase the number of cars furnished for loading. This was actually accomplished at the old plant, and inasmuch as the new plant will provide for loading a larger percentage of the total cars on the scales, it seems reasonably certain that even better results towards intensive loading of railroad equipment will be obtained. An interesting feature in connection with the scale installation, providing 4 modern scales all parallel, is the fact that by means of extension levers all weight bears



re located in a small but well lighted and convenient weigh house and all weighing will be performed by one weighmaster who will have the four weigh beams within easy reach.

Arrangements have also been made for loading on a sixth track running alongside the oversize bins, which are the outside row of bins on the side of the building farthest from the crusher house.

The bottom discharge bin gates are all of the scissors type, developed by the Kelley Island Company and built in their own shops.

Four 30x30 inch air operated quadrant bin gates with hinged counterweighted spouts will serve the outside track mentioned above.

All tracks serving the screenhouse are gauntlet tracks having both standard and 36 inch gauge, making it possible to load any product in standard gauge cars for rail shipment, or to load in narrow gauge cars for any one of all of the following purposes.

Oversize stone to lime kilns.

Any finished product, either to stock pile or to dock for boat shipment.

Fine material to agricultural lime stone grinding plant.

Elevated runways are provided from which the car loaders can operate the bin gates and observe the cars from above as they are being loaded.

The crusher house, bins, screenhouse and conveyor gallery are constructed of steel throughout with corrugated siding and roofing.

It is believed that this plant will set a high watermark in the provisions made for interior lighting. Large ample window spaces are allowed for each bay and above each floor, insuring excellent lighting in the interior of the building under all weather conditions. These spaces are fitted with steel sash, glazed with plain glass to permit clear vision over quarry.

The proportions of the building are

generous in every part and the utmost care was exercised in designing the plant to provide ample space around each and every machine for inspection, lubrication and repairs.

In this connection it is safe to say that no crushing plant yet erected has as thorough provision as has this plant for handling repairs in a quick and efficient manner. Not only have cranes and crawls been installed over all the heavier machines, but an electrically operated freight and passenger elevator has been put in which will serve every floor in the screen house.



Note the Trim and Roomy Construction

This elevator has sufficient lifting capacity to handle repair parts for every machine in the building, excepting only the heavier parts of the two No. 8 crushers. Mention has been made heretofore of the arrangement for hoisting these heavy parts into the building, an operation which will have to be performed very infrequently.

The value of an elevator in a plant of this size and character can hardly be overestimated, and it is safe to say that no piece of equipment in the plant will render a return on the investment more quickly than will this equipment. Not only will it serve

to expedite the hoisting of repairs parts to the various floor levels, but it will also afford a quick and easy means for the operating men and foremen to get into every part of the building for inspection. This is a feature that has been sadly overlooked in practically all high crushing plants in the past with the inevitable result that the upper parts of the building are generally unknown regions to the supervising members of the operating crew.

In addition to the elevator, there are stairways reaching every floor and there are also stairways extending along both sides of the pan conveyors. It should also be noted that these pan conveyors are completely housed in from top to bottom. These latter features are refinements which will be envied by those operators who are running pan conveyors erected in the old way on skeleton trestle-work with nothing overhead but the sky and nothing alongside but air.

Unusual precautions have been taken to insure the bodily safety of the men who will operate the plant. Guards made of heavy sheet metal enclose all of the gears and special care has been taken to make these gear guards dust proof. All belts and other moving parts which might be dangerous to the operating crew have been thoroughly guarded. All runways and stairways are equipped with heavy hand rails and toe boards.

Both the screen house and crusher house are constructed with pent houses above the center bay and these pent houses are fitted along both sides with large butterfly ventilators, the idea here being to create an upward air draft through the building which will carry away a considerable percentage of the dust that would otherwise settle on the floors, beams, and machines in the building. The ventilators in the crusher house will also serve to carry away the smoke created by the locomotives as they pass through.

That phase of the plant design embracing the electrical equipment has been taken care of with a thoroughness that is rather unusual in crushing plant construction and the details are interesting and instructive enough to warrant treatment at some length. The feature of individual drive has been carried out to its ultimate possibility.

Each and every machine in the plant has its own individual motor and most of those motors are geared directly to the machine which they drive. Belt and rope drives have been used only where their use was essential in order to absorb shocks and irregularities of drive which are inherent in the particular machines for which this type of drive was selected.

In the design of the electrical system throughout, including switching equipment with its protective features, power distribution, etc., the dominating thought was—

1st.—Safe operation for man and equipment.

2nd.—Economical and continuous production and accessibility of machinery for quick repairs.

3rd.—To obtain graphic record of operations.

Electric power is purchased from a public utility company located 12 miles away and delivered at 23,000 volts, 3 phase, 25 cycle, over a transmission line serving this plant individually. This current is stepped down at the plant to 460 volts through three Allis-Chalmers 500 KVA single phase oil insulated self-cooled transformers installed in a fire proof sub-station located at one corner of the crusher house adjacent to the pan conveyor. This sub-station will also house all primary switching equipment, aluminum cell lighting arresters, main switchboard, etc.

The main switchboard, consisting of the following panels, is so located to receive the high tension power, deliver the low tension power with a minimum expenditure of copper and



offer maximum accessibility for inspection and maintenance.

PANEL A—Incoming Line.

PANEL B—Feeder circuit for one crushing unit.

PANEL B-1—Feeder for second crushing unit.

PANEL C—Feeder circuit for miscellaneous load.

PANEL D—Feeder circuit for quarry load.

PANEL E—Feeder circuit for lighting.

The incoming line panel handles the total power requirement at primary voltage through a remote mounted non-automatic oil circuit breaker and the



Top of a No. 8 Crusher

Following equipment will be mounted hereon—

- 1—Indicating ammeter.
- 1—Indicating voltmeter.
- 1—Graphic voltmeter.
- 1—Watthour meter (Power Company's).
- 1—Demand meter (Power Company's).
- 1—Watthour meter (Owner's for checking).

The feeder panels B and B-1 each control the power to a complete crushing plant unit starting with the No. 1 breakers and ending with the shaking screens.

The third feeder panel controls power to miscellaneous motors, such

as the sump pump motors, elevator, air compressor, crane, etc.

The fourth feeder panel controls the power for all quarry use, such as well drills, etc.

Each feeder panel has an indicating ammeter and a panel mounted hand operated oil circuit breaker with automatic overload trip. The circuit breakers on the two crushing plant feeder panels are equipped also with automatic undervoltage release and there is also mounted on each of these panels a graphic wattmeter.

The function of the graphic voltmeter on incoming line panel "A" is to record voltage variation, and to fix the responsibility for any total plant interruption which might be due to low or no voltage, and to record the time and duration of such power outage. Likewise the graphic wattmeters on feeder panels "B" and "B-1" will record the power consumption plotted against time, of each crushing unit clearly indicating what percentage of the total production of crushed stone was made by each unit. These charts will also tell just how regular the crushers have been fed, the number of times they have been without stone, the period of such delay and the maximum peak of power consumption and its duration. With this information, which can be had daily or weekly, the management has the opportunity of removing the cause of irregular feeding, the possible unbalanced production from each unit and to avoid or cut-down those costly power peaks.

All slip ring motors are provided with a drum type starter, starting resistance for two minute service, primary oil switch with automatic overload and no voltage release, magnetic interlock and indicating ammeter mounted on the oil switch cover. The squirrel cage motors have potential starters with automatic overload and no voltage release.

The no voltage release feature on the oil switches of feeder panels "B" and "B-1" and on the individual oil switches for motors, serves in addition to its regular function of opening the circuit when power has been discontinued, the purpose of providing an emergency stop through push-buttons which are conveniently located at various points in the plant. By means of these push-buttons the plant machinery can be instantly shut down in case of a serious accident to any of the machines, or what is more important, in the event of a man falling into the crusher or being caught in any of the moving elements.

The main feeder circuits leading from the substation are located underground, permitting free and unrestricted passage between the buildings. These main feeders terminate in a junction box under the pan conveyor and from this point the leads are split up going both to the crusher house and screen house. In the screen house, located in the center of the building just above the top of the storage bins, is a distributing board. This board is of the dead face type, dust proof, and arranged with switches and fuses on the front. The rear of the board is provided with large doors giving access to sub-feeder terminals, busses, etc.

From this board leads are distributed to the various motors in the screen house.

Particular emphasis was given to the safety of the operators and to permit repairs to the electrical equipment without interrupting service to any equipment other than that requiring attention. A disconnecting switch of the enclosed and unfused type is placed ahead of all starting apparatus rendering that equipment safe to work on.

Full consideration was given to the harmful effects of dust to electrical machinery, and to minimize whatever injury might ensue, the slip rings of

all motors are fully enclosed, the bearings made dust proof and all oil switches are provided with dust proof covers.

All wire and cable, excepting that which runs underground, is rubber insulated, conforming in size to at least the latest requirement of the National Electric Code. In some applications larger than code sizes are used in order to meet individual requirements.

All wires are run in rigid metal galvanized conduit and flexible conduit connections are used between the rigid conduit and the terminal head of the motors.

No expense and no effort has been spared by the officials of the Kelley Island Lime & Transport Company and those who cooperated with them in designing, equipping and erecting of this plant to make it modern, efficient and complete in every detail, and the net result of this cooperation is a manufacturing unit that is the last word in rock crushing plant construction.

The officials of the Kelley Island Lime & Transport Company whose progressive policy has made this plant possible are Jno. A. Kling, president; G. J. Whelan, vice president and general manager; I. J. Sauvey, supt. of construction; A. C. Schultz, chief engineer.

The plant was designed by the engineers of the Allis-Chalmers Manufacturing Company, working in conjunction with the Kelley Island officials. The crushers, pan conveyors, screen elevators, belt conveyors, quadrant gates, transmission equipment and all electrical equipment, starting from the high tension wall bushings in the substation and including the motors and control equipment were furnished by the Allis-Chalmers Manufacturing Company.

The electric cranes in the crusher





A Train of 11 Cars was Used to Deliver the Allis-Chalmers Equipment

and screen house were furnished by the Cleveland Crane Company.

The steel buildings were fabricated by the Jones & Laughlin Company, who also made the stress sheets and fabrication drawings.

The erection of the steel work was performed by the Massillon Bridge Company.

The Standard Scale & Supply Co. furnished the track scales. The freight and passenger elevator was furnished and erected by the Kieckhefer Elevator Company. All electric wiring work was performed by the Dingle-Clark Co. of Cleveland, Ohio.

The foundation work and machinery installation was taken care of by the Kelley Island Company's own organization under the direct supervision of Mr. Sauvey and Mr. Schultz.

It is expected that the plant will be in operation about December 15th, this made possible by the establishment of an interesting record in connection with the erection of the two

No. 24 Crushers. After completion of the crusher foundation, which extends 40 feet below the quarry floor, the problem of placing the No. 24 crushers was met by the use of a 160-ton railroad wrecking crane owned by the New York Central Railroad Company. In each crusher, there are parts weighing 34, 48 and 60 tons respectively. Both crushers were placed in position complete with all bolts entered and nuts started in 17 hours working time. Credit for this performance is acknowledged to Mr. Julius Grossman, foreman of the wrecking crew of the New York Central Railroad, and to Mr. I. J. Sauvey, superintendent of construction of the Kelley Island Lime & Transport Company. It will be noted from the accompanying photographs that it required eleven large railroad cars to transport the parts of the two crushers which were handled by the wrecker.

T. E. Doremus, who for the past three and a half years has represented E. I. du Pont de Nemours & Company, as general Eastern manager for the Orient, with headquarters at Shanghai, China, has returned to the United States. Mr. Doremus is now located at Seattle, Washington, where he is manager for the explosives department of the du Pont Company.

Articles of incorporation have just been granted by the Secretary of State of Michigan to the Detroit Gravel Company in the amount of \$1,250,000 and the incorporators are F. D. Coppock, C. E. Patty, Guy C. Baker,

Fire destroyed the Isco-Bautz silica mill, at Wolf Lake, Illinois, on the night of December 4th. The management attributed the fire to a forest fire in the region. This mill was a valuable piece of property but had not been worked for some time.

The Concrete Ingredients Corp., Syracuse, N. Y. has been incorporated with a capital of \$500,000. The incorporators are Frank A. Eldredge of Auburn; Robert A. Downey of Oswego; and Frank D. Eno of Syracuse. The corporation has acquired the property of the Serro Sand and Gravel Co., of Minetto, and also has large holdings at Little Sodus Bay, N. Y.

## All Set for Stone Meet

### Quarrymen to Foregather for Three Days at Chicago

The National Crushed Stone convention, Chicago, January 15-17, La Salle Hotel, is already a record breaker. Representatives from more than half the states of the Union will attend. Last year was a big convention. The attendance will be more than double this year. The American Road Builders' Convention and Road Show are on the same time and place. Many quarrymen are urging state highway officials to attend.

Many plant superintendents and foremen are coming. These men are mighty factors in plant production and cost reduction. Special features of the program have been especially planned to interest and instruct the captain and the general of your plant. By all means give your man a week off and let him be one of us at the world's greatest stone meeting.

#### MONDAY, JANUARY 15

10:30 A. M.  
Address of Welcome. By Charles R. Francis, Commissioner of Public Works, City of Chicago.

10:45 A. M.  
President's Address.

11:00 A. M.  
Report of the Secretary and Treasurer.

11:15 A. M.  
"Business Principles Applied to Quarry Development and Stone-Crushing Operations—What Factors Make a Rock Deposit Worth Developing; Market Possibilities; Trade Ethics, and Factors Which Influence the Investment of Capital." By W. C. Huntington, Associate of E. C. Welborn, Business and Engineering Counsel, Chicago, Ill.

11:30 A. M.  
"Transportation Situation Reviewed." By E. J. Krause, Past-President of the N. C. S. A. and Vice-President and General Manager of the Columbia Quarry Co., St. Louis, Mo.

12:00 A. M.  
Discussion of Transportation Situation.

12:30 A. M.  
Luncheon by Groups in separate rooms on the mezzanine floor. Rooms to be announced at the morning session. Special table d'hôte luncheon served.

(A) Agricultural Limestone Producers.

(B) Ballast Producers.

(C) Concrete Aggregate Producers.

(D) Granite Producers.

(E) Machinery and Equipment Manufacturers.

2:00 P. M.

"Visualizing the Possibilities of Stone

Quarries." By Waller Crow, of Waller Crow, Inc., Engineers and Financial Advisors, Chicago, Ill.

2:15 P. M.

"Information and Data a Banker Wants to Know About a Quarry Industry." By J. E. Lindquist, Vice-President, Central Trust Co., Chicago, Ill.

2:30 P. M.

"Valuation of Stone Deposits, Including Exploration of Quarry Property; Geological Data; Exploitation Possibilities, Etc." By Joel H. Watkins, Mining Geologist, Leesburg, Va.

2:45 P. M.

Report of the Research Committee. Harry H. Brandon, Ohio Marble Co., chairman. Professor Withrow, research specialist of Ohio State University, Columbus, Ohio, will be a guest of the committee and explain in detail a proposed research program for the N. C. S. A. for the N. C. S. A.

General Discussion of the Report of the Research Committee.

3:30 P. M.

"Trade Association Activities." By J. M. Pritchard, Secretary-Manager of the Hardwood Manufacturers Institute, Chicago, Ill.

7:30 P. M.

Showing of a four-reel film by the U. S. Bureau of Mines, entitled "The Modern Goliath," or the story of heavy excavating machinery. The showing of this film will last about 45 minutes and will be followed by an informal discussion of modern quarry equipment and quarrying costs.

#### TUESDAY, JANUARY 16

Dr. Oliver Bowles, Chairman

9:00 A. M.

Introductory Address. By Dr. Oliver Bowles, Mineral Technologist, United States Bureau of Mines, Washington, D. C., on his studies of quarry practice and methods, illustrated by lantern slides and motion pictures; with special reference to stripping operations.

Discussion of Stripping Methods and Costs. By W. N. Spencer, Independence, Mo.; W. S. Charles, Charles Stone Co., Marion, Ill., and others.

9:30 A. M.

"Drilling and Blasting" (illustrated with lantern slides). By J. Baral, Engineer, Hercules Powder Co., Wilmington, Del.

9:45 A. M.

Discussion of Drilling and Blasting. Led by paper by Alexander McKernan, Superintendent, New Haven. Trap Rock Co., New Haven, Conn., with motion pictures of the company's remarkable operation.

10:00 A. M.

"Blasting Experiences in a City." By Otho M. Graves, Assistant to the President, General Crushed Stone Co., Easton, Pa.

10:15 A. M.

"Handling Stone in the Quarry and Quarry Transportation." By George E. Ladd, U. S. Bureau of Public Roads, Washington, D. C., formerly of the U. S. Bureau of Mines.

10:30 A. M.

General Discussion of Quarry Transportation. Led by F. T. Gucker



- of the John T. Dyer Quarry Co., Norristown, Penn., with illustrations of the use of motor trucks for hauling from quarry to crushers, and Norman Hely, of Cape Girardeau, Mo.
- 0:45 A. M.  
 "Steam-Shovel Operating Costs." By A. C. Vicary, Vice-President of the Erie Steam Shovel Co., being the first public announcement of the results of the Erie Steam Shovel Co.'s Prize Contest on Steam-Shovel Operating Records.
- 1:00 A. M.  
 "Gasoline Quarry Locomotives." By H. R. Sykes, Fate-Root Heath Co., Plymouth, Ohio.
- 1:15 A. M.  
 "Reducing the High Cost of Accidents." By Sidney J. Williams, Chief Engineer, National Safety Council.
- 1:30 A. M.  
 General Discussion of Quarry Labor. Led by President W. Scott Eames and F. W. Schmidt, Morristown, N. J.
- 2:30 P. M.  
 Luncheon by Territorial Groups in Separate Rooms on the Mezzanine Floor.  
 (A) Eastern.  
 (B) Central Western.  
 (C) Southern.  
 (D) Far Western.
- 3:00 P. M.  
 "The Jaw Crusher as a Primary Breaker." By C. G. Buchanan, President of C. G. Buchanan Co., New York City.
- 3:15 P. M.  
 "The Gyratory Crusher as a Primary Breaker." By W. J. Roberts, President, Traylor Engineering and Manufacturing Co., Allentown, Pa.
- 3:30 P. M.  
 "Roll Crushers as Primary Breakers; and Secondary Breakers, Screening and Sizing." By Brownell McGrew, Engineer, Allis-Chalmers Mfg. Co.
- 4:45 P. M.  
 "Washing and Separation of Sizes by Hydraulic Methods." By Edmund Shaw, Consulting Engineer, Chicago.
- 5:00 P. M.  
 General Discussion of Crushing and Screening. Led by L. H. Steward, Consumers Co., Chicago.
- 5:15 P. M.  
 "Storage and Shipping" (illustrated with lantern slides). By Gordon Smith, of J. C. Buckbee Co., Chicago, Consulting Engineers.  
 Discussion of Storage and Shipping. Led by C. A. Freiberg, General Manager, Buffalo Cement Co., Buffalo, N. Y.
- 5:30 P. M.  
 General Discussion of Quarry Operation.
- 5:00 P. M.  
 Ten-Minute Papers on New Equipment and Devices.  
 "A New Type of Shovel for Crushed Stone Handling." By George E. Deatherage, General Manager, The Hoar Shovel Co., Duluth, Minn.  
 "New Roller Grizzly." By Thomas H. Robins, Jr., Robins Conveying Belt Co., New York City.
- "Steel-Belt Conveyors." By Mr. Harry Carlson, Engineer, Sandvik Steel, Inc., New York City.
- "Electric Storage Battery Locomotives." By C. W. Chappelle, Ironton Engine Co., Ironton, Ohio.  
 Other manufacturers have equal opportunity to present new developments in equipment and machinery.
- 6:30 P. M.  
 Annual Banquet of the National Crushed Stone Association.  
 Prominent guests and speakers will include W. H. Finley, President of the Chicago and Northwestern Railway; J. E. Gorman, President of the Chicago, Rock Island and Pacific Railway; C. H. Markham, President of the Illinois Central Railroad; C. E. Spens, Vice-President in Charge of Operation, Chicago, Burlington and Quincy Railroad; Dr. W. H. Hatt, Chairman of the Highway Research Committee, American Engineering Research Council, Washington, D. C.; Thomas H. MacDonald, Chief, U. S. Bureau of Public Roads; E. J. Mehren, Editor of Engineering News-Record; T. J. Wasser, President, and James H. MacDonald, Treasurer, of the American Road Builders' Association.
- WEDNESDAY, JANUARY 17
- 10:00 A. M.  
 "Cost Accounting Principles and Their Application to the Crushed Stone Industry." By George W. Hafner, Expert Cost Accountant, Chicago.
- 10:30 A. M.  
 Discussion of Cost Accounting. Led by Otho M. Graves, Assistant to the President, General Crushed Stone Co., Easton, Pa.; H. E. Bair, General Manager, France Stone Co., Toledo, Ohio.
- 11:00 A. M.  
 "Merchandising Quarry Products." By George E. Schaefer, Sales Engineer, General Crushed Stone Co., Rochester, N. Y.
- 11:15 A. M.  
 "Merchandising Crushed Stone Products." By R. F. Scherer, Sales Engineer, Western Lime and Cement Co., Milwaukee, Wis.
- 11:30 A. M.  
 "Merchandising Crushed Stone Products." By Harry H. Brandon, Ohio Marble Co., Piqua, Ohio.
- 12:00 A. M.  
 General Discussion on Merchandising Quarry Products. Led by F. W. Schmidt, Morristown, N. J.
- 1:00 P. M.  
 General Luncheon in the Red Room.
- 2:00 P. M.  
 "Stone Screenings as Fine Aggregate for Concrete." By Prof. Duff A. Abrams, head of the Structural Material Research Laboratory, Lewis Institute, Chicago.
- 2:15 P. M.  
 "Crushed Stone Railway Ballast." By Theodore Bloecher, Jr., Division Engineer, Baltimore and Ohio Railroad, Baltimore, Md., representing the Ballast Committee of the American Railway Engineering Association.
- 2:30 P. M.  
 "Blast-Furnace and Open-Hearth Furnace Fluxing Stone." By J. H. Campbell, Engineer, R. W. Hunt & Co., Testing Engineers, Chicago.

2:45 P. M.

"Co-operation in Industrial Research With Special Reference to the Fire Tests of Reinforced-Concrete Columns and the Showing Made by Crushed Stone Aggregates." By S. H. Ingberg, Physicist, United States Bureau of Standards.

3:00 P. M.

"Agricultural Limestone." By John T. Woodruff, Springfield, Mo.

3:15 P. M.

"Special Uses of Crushed Stone." By John J. Sloan, Secretary, Wisconsin Granite Co., Chicago.

3:30 P. M.

General Discussion of Uses of Crushed Stone.

4:00 P. M.

Election of Officers.

4:30 P. M.

Meeting of Board of Directors.

## To Talk Sand and Gravel

### All Signs Point to Big National Convention

ADDRESSES on every phase of the sand, gravel and stone industry in addition to talks on business problems generally by men of national prominence will feature the annual convention of the National Sand and Gravel Association in this city on January 24, 25 and 26. Secretary Barrows, who is arranging the program for the convention, states that it is so incomplete that he cannot make definitely known the names of those who will speak or what their subjects will be. However, members of the association will be notified in ample time.

Secretary Barrows states that he expects to make this the biggest and best convention the National Association has ever held, and requests from members of the association for hotel reservations indicate that the attendance will be as large or probably larger than that of any former convention. The convention headquarters will be located at the Raleigh Hotel.

One of the important features of the convention will be open discussions, following the addresses, in which the membership will participate. It is believed that through this

means members will gain more direct benefit to their business than in any other way. It is explained by Secretary Barrows that the convention is not exclusively for the members of the association, but that non-members are welcomed and will find in attending an opportunity to meet the leading sand and gravel producers of the country as well as absorb some of the benefits which the convention will offer.

Several leading matters will be brought up for attention on the floor of the convention, including the introduction of Senate Bill 690 at the new Congress; the possibility of proceeding to abolish the present railroad demurrage rules which permit coal operators to hold cars on their sidings, loaded or empty, without the payment of charges; the modification of the "frozen car" demurrage rules which allow only 48 hours additional free time for unloading frozen materials from cars; the prospective supply for next year; the possibility of priority orders and the laying of plans for action in the event they do come. All members in attendance at the convention will be afforded the privilege of taking the floor and voicing his opinion as to the best courses the National Association should pursue in these various matters.

The demand for Austrian cement has increased very rapidly the past months, and the 18 cement plants established in Austria are unable to furnish the quantity required. Inquiries arrive daily from Germany, Bulgaria, Roumania and Hungary, and great efforts are being made to meet these requirements.

The Mineral Products Co., of Newcastle, Pa., have plans under consideration for the erection of a \$50,000 plant near the Harbor Bridge, at Newcastle. Mr. David Kay is president of this company.





## Producing Good Limestone Products Efficiently

THE Racine plant of the Consumers Company, the most recent of this large and important concern's crushed stone operations, is a model of mechanical efficiency and flexibility, and all-around economy of operation. The plant has been turning out crushed stone since last June, when it took the place of the Consumers Company's old mill and quarry, located a short distance away. An amount of machinery from this earlier operation has been erected in the present plant, but most of the equipment is new and arranged in a greatly different manner from that in the older plant.

The design of the present Racine plant is largely the work of Mr. C. B. Magrath, manager of the crushed stone department of the Consumers Company. Mr. Magrath is an experienced engineer. He has been in charge of a number of large operations, and

brought to the work of designing the Racine plant an experience that shows itself in many of the Racine plant's labor saving features.

The property extends over some 150 acres. In it there is a ledge of stone 70 feet thick, covered in some places by an overburden of 8 feet and in other places with only a few inches of soil. One of the principal operations this winter will be that of stripping sufficient overburden to allow for unhampered operation during the producing season. The stripping will be done by a Bucyrus shovel. Two of the company's Davenport locomotives, now in use around the quarry, will be utilized to haul the four 18-yard dump cars which will convey the stripping away from the operation itself. It is expected that it will not be necessary next year to do any stripping during the producing season.

The material that the company is



A Pretty Shot. Note How Evenly the Stone at Right is Rising. It Dropped as Nicely

crushing is a hard argillaceous limestone, which is in big demand as a concrete aggregate in the territory that the Consumers Company serves. The formation is massive in most parts of the quarry, a condition that makes drilling a little more difficult than it would be if the material were rather thinly stratified. The quarry floor is practically level, each successive blast having been arranged with this idea in mind. The ledge is worked, of course, on the single face quarrying plan, drills going down each time 4 feet below the floor level. The maintenance by careful blasting of this level quarry floor makes for economies of time and fuel in the operation of the locomotives that haul the dump cars.

A number of very fine blasts have been made at this quarry. The usual shot runs about 30 holes and is made with 60 per cent dynamite. One of the accompanying photographs shows a former blast just at the time the dynamite was touched off. The whole mass of stone at this time, rose evenly as shown in the photograph, and dropped

neatly at the foot of the face, leaving but little stone that needed secondary blasting. A considerable amount of the credit for the effectiveness of former blasting operations is due to Mr. A. L. Adrian-son, formerly of the Consumers Company, now interested in the manufacture of Universal Vibrating screens. Mr. Adrian-

son, at the time he was with the company, supervised the loading of holes, made the electrical connections and performed the work incidental to detonating the charges.

In the drilling operation a Clipper electric drill is used for sinking the holes to the bottom of the quarry floor. Drilling, as mentioned before, is mostly through a massive limestone. In some parts of the quarry, though there are clay pockets. A Keystone steam drill is employed for loading dynamite into the holes. In some sections of the quarry this loading operation is made rather more difficult by the presence of clay in the holes.

Stones that require secondary blasting are block holed by Ingersoll-Rand



A Section of the Quarry Showing Screening Dump



jackhammers, operating from an air line that supplies the mill and quarry and which is kept under pressure by two Gardiner air compressors. Jackhammers are used in all cases where stone is to be broken. Dobie shots are made only under very unusual circumstances.

Stone is loaded into dump cars by a Vulcan 110-ton shovel, equipped with a 3½-yard dipper. This shovel loads the end dump cars with 3.3 cubic yards capacity each.

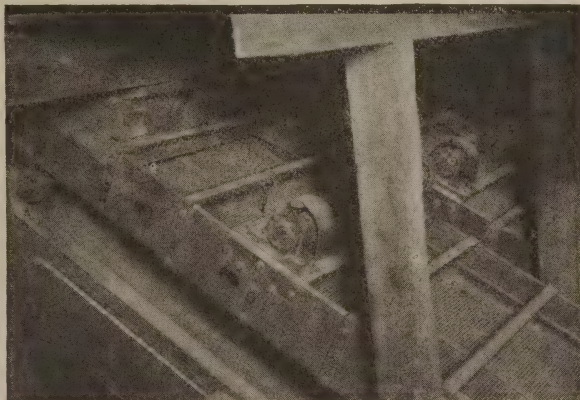
Three 8-ton Davenport steam locomotives are used for moving these cars between the shovel and the incline going up to the plant. The track system is well arranged. It permits a train of stone to go back to the plant in a number of different ways, and thus avoid delays which would otherwise occur, due to the positions of the other locomotives at any particular time.

When the cars of stone come up to the incline, they are attached to a cable line to the plant, and by this means are hoisted up to a bin above the primary breaker. The balanced car plan is not used at this quarry, and the conditions do not appear to demand its use to effect an economy of any kind. The cable haul is comparatively short and the operation of bringing up a car speedy. The bin above the primary breaker is sufficiently large to hold a good supply of stone and make unnecessary the rapid dumping of small quantities.

The primary breaker is a 36x60-inch Fairmount single roll crusher which will pass stones up to 8 inches. The product of this roll crusher goes to a bucket elevator 70 feet between centers with a pitch 65 degrees and with

buckets 42 inches wide. Buckets for this elevator have been supplied by the H. B. Sackett Screen and Chute Company. This bucket elevator discharges into two 48-inch Allis-Chalmers scalping screens. Each of these screens has a 12-foot section of 1¾-inch perforations, separating the stone into three sizes; minus 1¾, plus 1¾ to minus 3¼, and plus 3¼.

The minus 1¾ material goes to a 24-inch elevator which dumps at four



One of the Batteries of Universal Vibrating Screens

double-decked Universal vibrating screens, the upper deck of which separates at ½ inch, and the lower at 1½ inch. The stone sizes between plus 1¾ and minus 3¼ drop back for re-crushing to a set of 24 by 54-inch Superior rolls made by the Power Mining and Machinery Company. The material from the crushing rolls goes on to a 24-inch belt conveyor, which also takes the product of two number 4 and one number 5 gyratory crushers which will be described later.

The material over 3¼ inches is dropped by a chute to a number 5 Austin gyratory crusher. What goes over the end of the scalping screen is conveyed to two number 6 Allis-Chalmers crushers by a 30-inch horizontal belt conveyor 28 feet between centers.

The product of the number 6 is



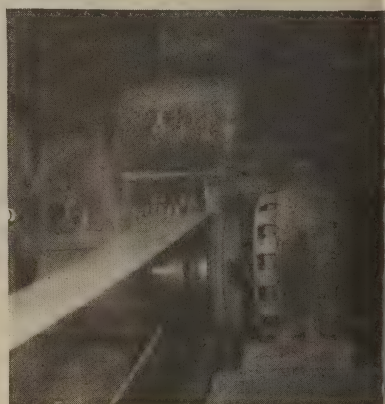
A McMyler-Interstate Crane is Used for Stock Piling

taken up by a 30-inch bucket elevator 74 feet between centers, to two 40-inch Allis-Chalmers scalping screens, each with two 8-foot sections of  $1\frac{1}{2}$ -inch perforations, one 8-foot section of  $1\frac{1}{2}$ -inch perforations, and one 4-foot section of  $2\frac{1}{2}$ -inch perforations. The stone that goes through is rescreened over two Universal vibrating screens with  $1\frac{1}{2}$ -inch cloth. The rejections from the scalping screen go to an 18-inch conveyor, 30 feet between centers, by which they are carried to two number four Allis-Chalmers crushers. The product of these last crushers, dropped to a 24-inch belt conveyor, are cross-conveyed to a 30-inch elevator, 74 feet between centers, which dumps into a 48-inch scalping screen with the same size openings as the pair of scalping screens last mentioned.

What stone goes through the  $1\frac{1}{2}$ -inch openings of the vibrating screens first mentioned, passes over two vibrating screens with  $\frac{3}{8}$ -inch openings, the rejections from which pass to a number 3 Austin crusher for re-grinding. The crushed stone from this number three goes the same way as the product of the number 4 Allis-Chalmers crushers mentioned above, and also meets the flow of material from the number 5 crusher and

crushing roll. All of these dump on the 24-inch conveyor.

There are at the plant ten bins, each arranged for both top and side loading, equipped with home-made slide cuts. Material that is intended for stock piling is handled by a McMyler-Interstate crane, which will pile one thousand tons in ten hours with a good operator. This crane is equipped with



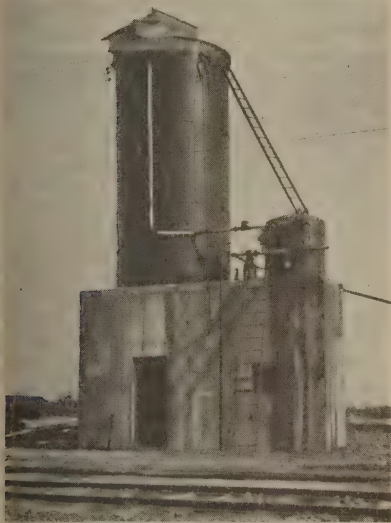
Set of Crushing Rolls for Fine Reduction

a  $1\frac{1}{2}$ -yard McMyler clamshell bucket. Loading out and spotting cars for stock piling is done by an 18-ton Dayton steam locomotive.

The supply of water available at the quarry is very hard, and when used in boilers, soon causes scaling. To meet this condition, the company has installed water softening apparatus manufactured by the International Water Company. This has proved very efficient, and the amount of boiler scale now encountered is a negligible quantity. The equipment softens three thousand gallons of water an hour.



changing it from thirty per cent. to less than seven per cent. hardness. The device consists essentially of a round tank twenty feet high and ten feet in diameter, a 3-inch centrifugal pump outfit, and a 60-inch filter, and a chamber for the softening chemicals, which after they have done their work, the filter removes.



International Filter Co.'s Water Softening Apparatus

The Racine quarry is equipped with a very complete blacksmith and machine shop, in which are lathes, drill presses, a shaper, and forging, welding, and grinding equipment. All of the repair work made necessary by daily operation is done in this shop.

The plant enjoys a considerable auto truck trade supplying considerable material for the road building jobs recently put through in that section of the country. Trucks are weighed on a Columbia scale, just outside the company's office located on the road leading to the city of Racine.

The superintendent of the Racine plant, Mr. Wm. Rankin, has had an extensive experience in the quarrying of limestone in Wisconsin and else-

where. To him is due a large part of the credit for the very successful operating season that is just ending.

## Good Roads Congress

THE thirteenth American Good Roads Congress, and the fourteenth National Good Roads Show will be held under the auspices of the American Road Builders' Association on January 15 to 19th, at Chicago. Extensive preparations are being made by the Association to make these two events the most important and successful that the road making industry has ever seen.

Invitations to the Congress have been sent to 85,000 state, county, and city officials, highway contractors, engineers and good roads advocates generally. The mayors of 5,000 American and Canadian cities and 3,000 commissioners, selectmen and supervisors or freeholders have each been asked to send five official delegates to the Congress. Exhibition room has been applied for at the show, to fill much more space than is in the Coliseum and other adjacent buildings. Excursion rates to Chicago have been granted by all railroads.

During the Congress, conventions will be held in Chicago by the Asphalt Association, Midwest section of the American Association of Engineers, National Crushed Stone Association, The Illinois Highway Contractors Association and the Illinois Association of General Contractors.

While the sessions of the road builders are being held, there will be on display in the Coliseum, building exhibits of machinery by the leading manufacturers of equipment used in road building.

Marbelite Corporation Co., of America, has been incorporated at Wilmington Delaware, with a capital of \$1,000,000, for the manufacture of asphalt and cement.

## Wisconsin Meeting

### Aggregate Producers Gather at Milwaukee for Work and Fun

ON THURSDAY, December 21st, the members of the Wisconsin Mineral Aggregate Association held their regular annual meeting at the Hotel Pfister, Milwaukee. The affair was similar to all others conducted by this association; that is to say, the members were brimful of enthusiasm, and proceedings were all along constructive lines. Many questions of interest to producers were thoroughly discussed.

The report of the secretary, Mr. M. K. Wilson, besides embodying a brief resume of the association's 1922 activities, drew attention to a few things that should engage the attention of the membership during 1923. One of these sections of the report reads as follows:

At the time of my coming into the association, I was somewhat startled at the shortness of the shipping season, as shown by records compiled by us in this office. It is a fact that 51½ per cent of the yearly tonnage shipped is concentrated in the months of June, July and August, while only 12½ per cent is shipped in the month of May and but 5 per cent in the month of April. These figures certainly should be food for thought. My efforts have been to add to our producing season, but how shall this be done? Contractors are loath to heed the warning given by any interested party. I might cite that early in the 1922 season, Mr. Hirst and members of the Wisconsin Highway Commission warned the contractors that there was every indication of there being a shortage of cement and open-top cars to move aggregate and that if they wanted to complete their jobs they should make every effort to lay in the necessary materials. In face of these repeated warnings, we are carrying over approximately 100 miles or more of

old work into the new year. Combined with this tonnage, we will have approximately 400 to 500 miles of new work, making the largest mileage in the history of the state. Putting forth the question of supplying this tonnage, we must view the railroads in the proper light, as approximately 50 per cent of the aggregate used in highway construction this next season must be shipped via railroad. Unfortunately, the supply of open-top cars on both the C. & N. W. and C. M. & St. P. railroads is limited. Consequently, in view of the extreme shortage of open-top cars, the large highway program of 1923 and possibilities (which I dread to think of) of another coal strike, we must do something to increase our shipping season.

Fortunately, our highway officials, in their competent way realizing the difficulties of the coming 1923 season and the necessity of having each yearly program completed, will incorporate in their 1923 specifications that, on all jobs where aggregate is to be shipped by rail and where ever feasible, a certain portion of the requirements must be in stock-pile. If you study this requirement, basing our figures on a program of 500 miles, it will mean that 250,000 to 300,000 tons of aggregate will be shipped in the early months.

After the business sessions the members met at a dinner and proved that they are just as capable of enjoying themselves as they are of conducting successful business.

#### PROGRAM

6:30 P. M.—Dinner.

After 1st course—Solo by Miss Lois James.

After 3rd course—Dutch dance by Miss Weber.

After 4th course—Solo by Miss Rene.

8:00 P. M.—Introducing Invited Guests

8:15 P. M.—Duet by Mr. and Mrs. Halverson.

8:25 P. M.

Toe Waltz by Miss Clauser.

Duet by Miss Lois James and Miss Rene.

Dance by Miss Weber.

Solo by Miss Paradise.

8:50 P. M.

Reading by Mr. E. G. Brown.  
Address by Mr. A. P. Sandles.



9:10 P. M.

Dance by Miss Clauser.  
 Duet by Miss Lois James and Miss Rene.  
 Solo by Miss Paradise.  
 International dance by Miss Weber.

9:30 P. M.—Community Singing, led by Miss Lois James.

9:45 P. M.—Address by the Hon. Henry R. Rathbone.

It is unnecessary to say that the program was enjoyed by all present. The speakers and entertainers are too well known in and around Milwaukee to leave any doubt of that.

## Indiana Crushed Stone Men to Meet in Chicago

THE December meeting of the executive committee of the Indiana Crushed Stone Association was held at the Association offices, Indianapolis, and it was decided to hold the annual meeting at Chicago during the National Crushed Stone Convention, LaSalle Hotel, January 15th, 16th and 17th, 1923.

The members present at the meeting reported a very good year for 1922 and the majority of the commercial quarries at this time are running full force. This is an exception for the month of December but it is due to practically two reasons, the increased demand for crushed limestone and weather conditions. State and county officials are becoming more exacting as to quality and preparation of road materials used in construction and maintenance, and the commercial quarries report that the year 1922 will go down in history as the biggest year in the history of the crushed limestone industry in Indiana. The members were very enthusiastic over the prospects for the coming year.

Several of the operators are contemplating increased demand for 1923 and are investing in additional equipment so as to take care of the demand as well as to be able to produce necessary sizes suitable for all types of road construction.

## Missouri Valley Association Meets

At Kansas City, on December 14th and 15th, the Missouri Valley Association of Sand and Gravel Producers held their annual meeting. This association is a 100 per cent organization of active gravel producers and their discussions usually are luminous rather than voluminous.

Harry E. Moore, of the Missouri River Sand and Gravel Company, Booneville, Missouri, was elected president for the new year succeeding J. M. Chandler of the Price Sand Company, Tulsa, Oklahoma.

## The Value of a Minute

NOTHING illustrates the value of a minute as does the overloading of trucks. Recently the writer had his attention called to several cases where heavily loaded trucks were stopped on the road by state automobile inspectors.

The inspectors produced from their automobile, weighing jacks which they placed under the truck wheels or axles. The loads were jacked up and weighed, an overload found. Part of the load was ordered taken off at once deposited on the side of the road.

This meant that another trip had to be made to carry a small load which would have been prevented if the load had been weighed before starting.

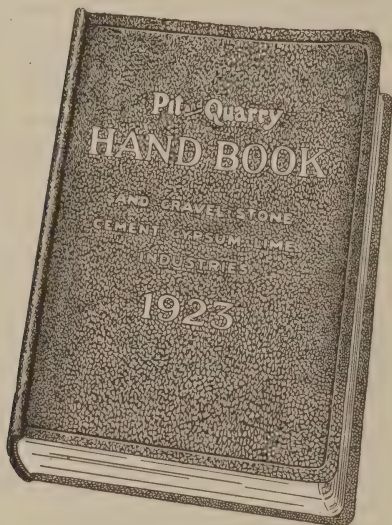
The query is made at once, "how can a load be weighed without scales." The answer is that, if jacks for weighing can be used at a moment's notice on a highway, the same weighing devices can be utilized by the producer for checking up all questionable loads before starting. This means to save time and the rehandling of part of the load when detected.

A man who appreciates the value of a minute in operating trucks will take the precaution to weigh first.

## Hand Book Is Popular

### Taking Well With Producers and Machinery Makers

SINCE announcement in the October number of PIT AND QUARRY that the publishers would compile and publish a HAND BOOK for operators of sand, gravel, stone, cement, gypsum and lime plants, there has continued a deluge of applications for free copies. Manufacturers of equipment and supplies for these industries



have likewise hurried in their reservations of space in the "Catalogue of Equipment," section of the HAND BOOK. A surprising representation of the manufacturers and their lines has, in this remarkably short time, gathered together. Already most of the eligible manufacturers of the various lines of equipment have arranged to catalogue their products. The greater part of those who have not yet made arrangements are compelled to delay their reservations pending development of their 1923 advertising schedule and the necessary appropriation which, in these cases, will not become available until the first of January.

The publishers are pleased to report to PIT AND QUARRY readers the compilation of the HAND BOOK nearing completion. While it is impossible as yet to predict the exact date of publication, the book will, all probability, go to press early in the new year.

Operators who have not already made application for a free copy of PIT AND QUARRY HAND BOOK, better do so at once by filling out and mailing to the publishers the application card which may be found inserted in this number of PIT AND QUARRY.

## National Slate Association Meetings

The slate industry will hold meetings in New York at the Commodore Hotel on Monday and Tuesday, January 22nd and 23rd, 1923 (note change in dates), under the auspices of the National Slate Association.

Operators of quarries producing slate, representatives of mills and plants manufacturing slate products, distributors, dealers, jobbers, roofers and setters of slate, and others from any branch of the slate industry are welcome.

Dr. Oliver Bowles, of the U. S. Bureau of Mines, will preside at the opening session devoted to an exchange of experiences by producers on quarry and production problems and the new uses of slate which were developed in 1922 to commercial stages and those still under investigation and trial or which should be undertaken.

Opportunity will be given equipment manufacturers for demonstrations of any new apparatus or methods, which are applicable to the slate industry.

President Keenan and the Board of Directors will announce the winning slogan and insignia. The advertising, research and other activities of the 1923 slate campaign are to be decided upon and definitely put under way, so that these meetings are extremely important to every slate man who wants more slate used and better conditions within his industry.



## Cement Districts Busy

### Satisfactory Conditions in All Producing Centers

Practically every mill in the Lehigh Valley district of Pennsylvania is on the producing list, and running under all capacity schedule. The usual announcements of annual shut downs for equipment repairs at this season of the year have not, as yet, been forthcoming, nor are they expected to be, or every effort is now being directed towards greatest output. Plants, of necessity, may be forced to suspend for a week or two before the winter is over, and this situation has prevailed in the case of one of the large producers, causing a shut down over the holidays.

Current account and incoming business have not permitted any noticeable filling of stock houses for the till greater demand now anticipated or the spring. Efforts, however, are being turned to this condition, and the next thirty to sixty days is expected to show fair progress in this direction.

The railroad situation is showing substantial improvement and more cars are available for cement transportation. At the same time, coal carries the preference, and locomotives and train crews are being turned in large numbers to this account. The month of December has shown heavy shipments from the mills for eastern and southern points, while motor trucks are still being pressed into service for distribution to nearby centers. The Philadelphia & Reading Railroad has been increasing its facilities on the Lehigh Valley branch, and has taken over a large accumulation of stock.

Labor conditions are fairly satisfactory. The mills, in a number of instances could use more men, but they are not available. The wage rates offered by the plants are equal to those of the steel mills and other important industries in this section. Both skilled and common labor is in demand, and hard men are particularly scarce.

The availability of railroad cars has been one to alleviate the bag shortage, referred to in the last issue of PIT AND QUARRY, and the majority of the mills are now in better position to operate continuously in the filling of

sacks. At the same time, there is no lessening in efforts to secure all possible returns, and regular requests are being issued to large contractors and dealers for the empties.

The Lehigh Portland Cement Co., Allentown, is maintaining full capacity at its local mill, while other plants of the company at Ormrod and New Castle are also on the active producing list. The company has, as yet, made no attempt at shutting down for machinery repairs, and probably will defer any such curtailment until well into the winter season.

The Whitehall Portland Cement Co., at Coplay is completing the construction of eight large bins for storage, 30 feet in diameter and 63 feet in height. Each bin will have a capacity of about 30 carloads of material, and conveniently situated for this purpose. The work is being carried out by the Turner Construction Co., New York. The company is running full in the different departments of the mill, giving employment to close to the regular quota of men.

The Coplay Cement Mfg. Co., Coplay, is the first plant in the Lehigh district to suspend for annual repairs, and was shut down from December 20 to January 1. The entire working force was engaged in the improvement work and it was carried through with dispatch. The company has made a desirable improvement at its quarry properties, constructing a fence, formed of concrete posts, heavy cables and wire, extending for a distance of more than 500 feet along the West Coplay road. The fence is of sufficient strength to protect traffic from the danger of the quarries.

There is nothing but activity to report from the various mills in these parts. At Northampton, the Atlas Portland Cement Co., is running under heavy output at its mills and big shipments are leaving daily. The Penn Allen Cement Co., is busy at its Nazareth plant, giving employment to a large number of workers. The Nazareth Cement Co., in the last noted section, is also running full under regular production schedule, while the Crescent Portland Cement Co., at New Castle is equally active.

There is no change in the mill base in the Lehigh Valley section, the quotation remaining at \$2.10 a barrel to dealers and contractors, without bags, in carload shipments.

## Situation Encouraging

### New York Reports Good Conditions for Late Season

By Our Eastern Correspondent

The situation in the sand, gravel and crushed stone markets at New York and vicinity is very encouraging for this season of the year. The activity in the general building supply business in this section is reflected in the calls for sand, gravel and affiliated materials for construction service. Supply dealers continue to stock up in these lines with surprising regularity for this season.

The labor conditions hereabouts are not of the best. Workers in the building industries are striving for a higher wage scale, and in the production end there is a scarcity of good, first class men that makes it exceedingly difficult to maintain operations at the desired status, and this, despite the fact that good high wage schedules are prevailing.

The different producing districts in and about New York and New Jersey, including the Cow Bay and Raritan River sections, are being assisted materially by the fine open weather, permitting a good tonnage of sand and gravel, and equally good distribution by motor trucks. Railroad cars are still scarce. It is likely that the majority of the plants will maintain production just as long as possible, if not throughout the winter period.

The market situation with respect to prices continues very satisfactory. Present levels are being held to quite rigidly, and current demand indicates that consumers expect a maintenance of prices. Producers hold to the opinion that there will be little, if any, change throughout the winter season, and particularly so with view to the existing labor conditions.

Best quality washed gravel is selling at \$2.00 a cubic yard in the New York market, both 1½ and ¾-inch sizes, and the advance of 25 cents a ton recently made in this product seems destined to retain in force. At this same time a year ago, the material was priced at \$1.75 in cargo lots. Retailers are getting \$2.75 a cubic yard, delivered in Manhattan and Bronx.

Sand is firm at \$1.00 a cubic yard in wholesale quantities for the best selections. Lesser grade stocks are

selling at 85 and 90 cents, but are not much in demand. Delivered on the job, the material is bringing \$2.00 a yard. Pure, white sand continues at a \$4.50 level at the different supply yards throughout the city.

Crushed stone in cargo lots, f. o. b. city, holds at \$1.75 a cubic yard for ¾-inch stock, and at \$1.75 for 1½-inch. These levels are quite in contrast to the figures of a year ago, when the smaller sized material was priced at \$1.90 and the larger size, \$1.80. Present quotations are firm, and there is no indication of any pronounced change, despite the seasonal lag in call. Retail dealers are asking \$4.00 a yard for both sizes delivered on the job within a certain radius.

Portland cement has remained stationary through the entire month, both in wholesale and retail quarters. The price to dealers and contractors along side dock is \$2.30 a barrel, in carload lots; delivered by truck, the price is \$2.60, as compared with a figure of \$2.40 a year ago. To the consumer the figure stands at \$3.20 a barrel, less the regular bag rebate of 10 cents each. The material is now reaching New York in sizeable shipments and sufficient for all current demand.

Building supply dealers at Boston, Mass., typical of the New England district, are selling cement in truck loads at \$3.60 a barrel, less bag rebate, and in smaller quantities at \$3.80. Crushed stone is being turned at \$2.50 a ton, delivered in the job, while sand is priced at \$4.00 a ton. Common lime is selling in this section for \$2.90 a barrel for 180-pound container, and \$4.00 for 280-pound. Finishing lime in the two sized barrels noted, is \$3.10 and \$4.35, respectively.

The heavy call for broken stone for concrete work and other kindred service in the New England district has developed to a point where producers and dealers are refusing orders. A number of plants are booked solid until well into the New Year, and recently a large dealer refused an order for 100,000 cubic yards to be delivered in a sixty-day period. The local industry has been severely handicapped by a shortage of labor, and accordingly despite the conditions for ready sale a number of quarries have only maintained about two-thirds of normal capacity. It is simply impossible to secure a full working force to permit maximum.



## Remove Priority Orders

### Victory for National Sand and Gravel Association

By Our Washington Correspondent

The revocation of priority orders giving preferential car service to the transportation of coal, which became effective at midnight December 11, was brought about to a greater or lesser extent through the efforts of officials of the National Sand and Gravel Association who have been fighting the existence of priority orders virtually over the period they have been in existence. This association was one of the pioneers, as well as one of the most persistent, in the fight for equal consideration in the matter of car distribution and transportation.

With the announcement by the Interstate Commerce Commission of the setting aside of Service Orders Nos. 4 and 25, which wiped out priorities, except in a few territories where individual railroads have been specifically required to furnish certain coal cars to specific mines for loading shipments to communities or purchasers who have a particular need for coal, the old order of things as to car supply is restored, according to the National Sand and Gravel Bulletin, which adds:

"If any carrier persists in denying cars to sand, gravel and stone producers while supplying them to coal mines, a charge of unlawful discrimination may be maintained and relief secured either through proceedings before state commissions or the Interstate Commerce Commission, according to the nature of the traffic. Some of our members with plants located on the Southern Railway are experiencing as much trouble since the lifting of the priorities as during the time the orders were in effect. In defense of their denial of service to sand, gravel and stone producers, the Southern has stated that their railway fuel supply is at a most critical stage and that they have been compelled to confiscate commercial coal in order to keep their trains running. However, Mr. Andrews, assistant to the vice-president of the Southern, has informed us that he anticipates that the situation will be satisfactorily

taken care of soon, and that from then on he will be able to provide coal cars for moving our materials."

Briefly, the setting aside of these two service orders means that all restrictions against the use of open top equipment by other than the coal industry have been removed and that the railroads are now free to distribute open top cars to any industry making a demand for them. Whether or not certain industries are able to get cars will depend upon the ability of the carriers to supply them. But in any case all industries using this class of cars are now on a par. In connection with the setting aside of the orders the only restriction is the requirement that all shipments must be forwarded by the most direct of routes available and without regard to the normal traffic arrangements between railroads. Since the service orders were put into effect early in the fall several modifications have been made in them by the commission, but in the territory east of the Mississippi have been, and until December 11 required to use nearly all the open-top car equipment in their possession exclusively for the transport of coal. This restriction has been an increasing cause of complaint from steel producers and contractors using building and road material.

Through Federal aid to the States, 10,247 miles of road products were brought to completion during the year, Secretary of Agriculture Wallace states in his annual report. Prior to the fiscal year 1922, 7,469 miles had been completed. This brings the total completed up to the end of the fiscal year to 17,716 miles. At the close of the year the projects under construction, amounting to approximately 14,500 miles, were estimated to be about 56 per cent complete.

"At the present rate of building not many years will be required to give the nation a connected system of good highways in all directions," declares the Secretary. "During the fiscal year 1922 Congress enacted legislation providing for the designation of a system of Federal-aid roads in all states, to consist of not more than 7 per cent of the total mileage of roads in the states, and authorizing appropriations of Federal aid in the construction of this system in the amount of \$50,000,000 for the fiscal year 1923, \$65,000,000 for the fiscal year 1924, and \$75,000,000 for the fiscal year 1925, thus deter-

mining and indicating to the states in advance of the actual appropriation of funds the amount of Federal aid to be extended, and consequently the rate at which the building of highways under this plan is to progress during the three ensuing years."

The Department of Agriculture, Secretary Wallace reports, is pursuing its scientific studies of road construction, maintenance and design. Out of these studies, it is said, is coming much exceedingly valuable information, which should result in both greater efficiency and greater economy in road building enterprises. During the fiscal year approximately 1,100 miles of national forest roads and 3,000 miles of trails were constructed by the department, bringing the total mileage of roads constructed in the national forests from Federal funds, supplemented at times by local cooperation, to nearly 5,000 miles, and the total of forest trails up to approximately 7,000 miles. The total expenditures to date for this type of work amounts to approximately \$17,000,000.

The total apportionment of Federal funds to the states, up to and including the fiscal year 1922, amount to \$339,875,000. Of this, \$297,018,923 had been set aside for definite projects, many of which had been completed prior to the close of the year, others placed under construction, and still others which were more recently approved were awaiting construction. The amount of Federal aid paid or due on completed projects up to the end of the year was \$132,079,204. The total cost of these projects, more than 50 per cent of which has been paid by the states, was \$309,466,524.

On projects under construction at the end of the year Federal aid has been allotted to the amount of \$109,989,757. The estimated total cost of these projects is \$254,269,813. The total amount of Federal aid actually paid to the states on completed and uncompleted projects up to the end of the year was \$166,911,552. During the fiscal year the total amount paid out of the treasury was \$88,216,122, which is greater by almost \$10,000,000 than was paid during the five years previous. Of the appropriations made by the Federal government there remained unobligated at the end of the fiscal year \$42,856,079.

## Pittsburgh Going Well

### Sand and Gravel Operations Hold Up at Good Level

By Our Pittsburgh Correspondent

Operations in the sand and gravel industry continue at a good point in the Pittsburgh, Pa., district and sizable cargoes are reaching the local port from the river points for immediate distribution. The regular winter lull in production has not been so noticeable up to the present time this year, and from all indications the leading producers will maintain activities as long as traffic remains good. Towboats are also being pressed into service for coal transportation, while dredging work for the different steel companies is still an important feature of current business.

Prices remain quite uniform, and substantially as set forth in the last issue of PIT AND QUARRY. Washed gravel is being sold f. o. b. float at \$1.60 a yard, while the usual delivery charges, varying from 40 cents to \$1.50, are made for distant distribution. A large quantity of the river material is being placed to use for concrete work in the city at the present time. Crushed stone holds at \$2.85 a cubic yard in wholesale quantities both for  $\frac{3}{4}$  and  $1\frac{1}{2}$ -inch sizes. Retail the material is priced at around \$4.00 delivered on the job.

First quality sand is being sold at the dock at \$1.35 to \$1.40 a cubic yard in cargo lots, and the past month has shown good distribution of material. Local producers are stocking up for immediate future demands, and this has developed a heavy river traffic. Building supply dealers are pricing high-grade river sand at \$2.35 to \$2.45 delivered. Portland cement, wholesale, is selling at \$2.24 a barrel, in cargo load lots, f. o. b. city, without bags. A year ago the wholesale price was around \$2.00. Dealers are asking \$3.25 a barrel for delivered stock, less bulk rebate.

The Rogers Sand Co. has been one of the active producers in this section during the past month, and large tons of sand and gravel have been brought from the digger at Cheswick. The steamer "Twilight" was idle for about a week for repairs at the company's dock at the foot of Ridge Avenue, and



meantime the towboats, "Sweetcake" and "Margaret" have been very active. The company has been making a number of boiler repairs in its fleet. Heavy operations have also been going forward in the line of dredging work, and a sizeable contract has just been completed for the Duquesne Light Co., at Elrama. The company is now busy dredging for the American Bridge Co., at Ambridge.

The Iron City Sand Co. is another active producer in the Pittsburgh district, and the tow-boat "Iron City" has been in constant service on the Monongahela River throughout the month. The company is also keeping its sand ligger in service. The Keystone Sand & Gravel Co. has been hauling heavy loads with its tow-boat "Victory," while the J. K. Davison Co. is also maintaining sizeable operations.

### New Michigan Crawler Crane

The machine shown in cut is the new Michigan Crawler Crane built by the Michigan Dredge Co., and equipped with dipper attachment. The machine on its first country trip of 4 miles to the pit of the Deckerville Construction Co. was made without a mishap, traveling at  $\frac{3}{4}$  miles per hour. Approximate weight 17 tons without dipper. Equipped with 4 cylinder  $\frac{1}{4}$ x8 inch Twin City motor.

Full information may be had by

writing the Michigan Dredge Co., Bay City, Michigan, requesting catalogues.

### Elimination of Misfiring of Center Shots

As a means toward the elimination of misfiring of center shots in large scale blasting in coal mines, the Bureau of Mines recommends that the following practices be used whenever shots are to be fired in wet holes:

Use water-proofed electric detonators with enameled leg wires.

When making connections with enameled leg wires, care must be taken to scrape the ends of the wires well, otherwise the enamel will prevent good electrical contact.

Fire the shots from an underground power circuit that has a capacity of at least 30 K.W.

Use extra care when tamping the holes in order not to damage the insulation of the leg wires.

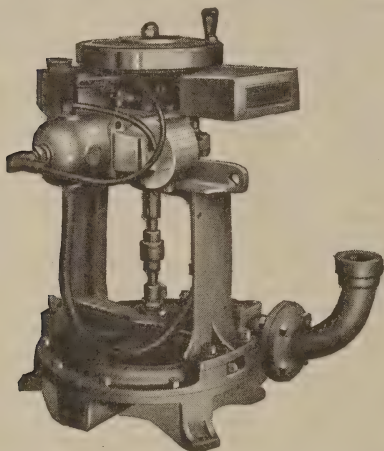
Arrange the connections between the detonators so that they are supported clear of the earth or any other conducting medium. Further details are given in Serial 2384, "Failure of Center Shots in Blasting," which may be obtained from the Bureau of Mines, Washington, D. C.

The Kaukauna Quarry Co., Kaukauna, Wis., has been incorporated with a capital of \$15,000. J. P. Frank, Robert H. Pelkey, and Elsie Koffend.



## Portable Centrifugal Pumps

A portable centrifugal pump, weighing under fifteen pounds and occupying a space 16x23 inches, should have many uses in the pit and quarry field, and so the Evinrude Motor Company of Milwaukee, Wisconsin, wish to bring to the attention of operators the Evinrude centrifugal pump. This concern has, for the past twelve years,



been manufacturing the Evinrude detachable rowboat motor, of which more than 150,000 have been sold. The Evinrude centrifugal pump has been on the market now about five or six years. It is operated from a 2 H.P. Evinrude gasoline engine and has a capacity of 5,000 gallons per hour at a 20 foot head. A special model with a  $3\frac{1}{2}$  H.P. Evinrude gasoline motor and pumping 7,400 gallons per hour at a 20 foot head, also belongs to the Evinrude line. This pump should be found useful whenever a temporary drainage job or water for special purposes is wanted about the erection of machinery. More detailed information may be secured by writing the Evinrude Motor Company, Milwaukee, Wisconsin.

## Equipment Company Moves

The Rennolds Equipment Company, dealers in used machinery, who up to this time have maintained offices at 11 South LaSalle Street, Chicago, Illinois, announce that they are moving from this location and that their address hereafter will be 712 Standard Trust Building, Chicago, Illinois.

## Speed Reducer Catalog

The W. A. Jones Foundry & Machine Company announce the publication of their new catalog No. 26 covering the Jones spur gear speed reducer. This is an entirely new edition and the information contained therein is intended particularly to be of value to consulting engineers, superintendents, chief engineers and master mechanics, or anyone who specifies mechanical drives for factories, mills, mines or plants. The edition embodies technical and practical information, complete descriptive matter and illustrations of drives. The installation section presents, pictorially, reduced drives in many large industrial plants. Dimensions, rates and horsepower ratings for complete speed reduction sets are shown. The company states that it is their intention to make this book a standard work of its kind and that they aim to place copies in the hands of all interested in speed reduction problems. They ask that requests for copies be made on business stationery, giving the name and title of the individual making the request. This will facilitate delivery. Address the W. A. Jones Foundry and Machine Co., 440 W. Roosevelt Road, Chicago.

## Folder on Power Drag Scraper

Interesting information about the Green Power Drag Scraper is contained in a folder put out by L. P. Green, 907 Lumber Exchange Building, Chicago. In this folder Mr. Green refers to the 200 installations of the power drag scraper that have been made in the last three years. This figure, while not very large, must still, Mr. Green remarks, be understood as a very good record. In the folder are given geographic locations of quite a number of the installations covering almost every state in the Union and points in Manchuria, China and Japan. The folder goes on to explain the service that L. P. Green is prepared to give to anyone investigating the possibilities of the power drag scraper and shows a number of photographs of the tool in actual operation. Copies of this folder may be secured by writing L. P. Green, 907 Lumber Exchange Building, Chicago.



## New Quarry Equipment Catalog

One of the most attractive catalogues of rock and gravel handling machinery is that recently issued by the Smith Engineering Works, of Milwaukee, Wis. This new publication, the front cover of which is here shown, is very well illustrated by cuts showing equipment of the company's manufacture, each illustration accompanied by a concise description and



abulated information. Some of the more interesting features of this book are complete showings of Tel-smith crushers, screens and sand settling tanks. On page 3 of the catalogue is shown a complete new line of Tel-smith primary breakers with several new sizes. The new model breaker includes a number of improvements over earlier machines, although no radical changes. More complete data on Tel-smith primary breakers will be included in the company's new bulletin No. 261-C, now in preparation. The No. 3 Tel-smith reduction crusher described on page 4 is a new size, not mentioned in any previous catalogue. This will also be catalogued more fully in bulletin No. 261-C. Pages 8 and 9 show a line of rotary screens, which have been re-designed and now appear with a renewable steel tracker ring

and angle iron frame. Pages 10 and 11 show the Tel-smith heavy duty washing screen with some changes, and include the new 24-inch size. On pages 12 and 13 are catalogued a complete new line of sand settling tanks with the improved tilting discharge. These tanks are guaranteed by the company to be absolutely automatic in operation.

Copies of this new catalogue, known as Tel-smith Bulletin No. 266-B may be secured by writing the Smith Engineering Works, 1154 32nd St., Milwaukee, Wis.

## New Edition Hendricks Commercial Register

The new, 1923 edition of Hendricks Commercial Register of the United States, is a book that separately classifies over 18,000 products, giving the name and address of every manufacturer and producer, together with the trade name or brand, if any. There are also essential facts regarding the products of the leading firms. These classifications are made of ready reference by a remarkable system of indexing and cross-indexing.

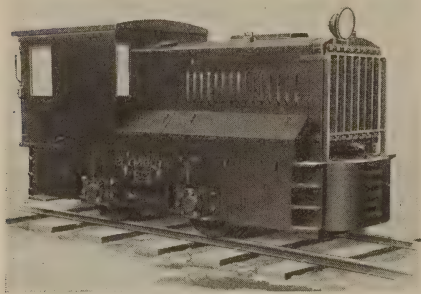
The 1923 edition contains 2,482 pages, 150 over and above the 1922 edition, and 125,000 changes and additions were made to the new issue.

The lists completely cover electrical, engineering, machinery, building, manufacturing, chemical and other industries. The lists are for the use of both buyers and sellers. All manufacturers and others included in the register, besides being listed under all the products they handle, are also arranged in one alphabetical section according to name. All brands, trade names and such, are arranged according to name in another alphabetical list, with name and address of manufacture following.

Hendricks Commercial Register of the United States is part of the Hendricks Information Service which latter also includes Hendricks Commercial Bulletin and the use of the Hendricks Information Bureau. The 1923 edition of Hendricks Commercial Register of the United States is sold for \$15.00. Copies may be had by addressing the S. E. Hendricks Co., Inc., 70 Fifth Avenue, New York City.

## Gasoline Locomotive Develops Remarkable Pull

In the 7-ton, four-speed, gear-drive gasoline locomotive announced by the Fate-Heath Co., Plymouth, Ohio, the manufacturers claim that in actual haulage test it developed and maintained a drawbar pull of 5250 lbs. on sanded rail. The four speeds are  $2\frac{1}{2}$ , 4, 8 and 12 miles per hour, either forward or reverse.



Plymouth 7-Ton, Four-Speed, Gear-Drive Gasoline Locomotive

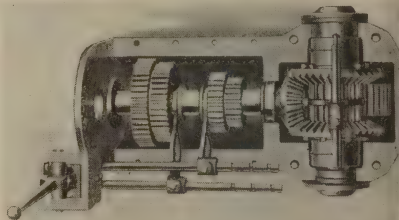
This remarkable showing is claimed to be due to the unique design and construction of the transmission. The gears are unusually large and massive, an exclusive feature being an additional shaft and final driving gear,  $14\frac{1}{2}$  inch diameter by 4 inch face. This gear permits of the proper speed reduction, and also places the sprocket shaft which it drives on the same plane with the axles, so that no jack-shaft is required. The other gears are 2 and  $2\frac{1}{4}$  inch face, of large diameter.

The sliding gears are made in pairs on the second driving shaft, giving extra long hub length, and reducing wear to a minimum. The gears that are driven are the only ones that are in mesh. Forward and reverse speeds are obtained by large bevel gears with internal gear teeth into which the pinion that drives the main gear meshes, thus doing away with clutches.

All gears are of alloy hardened Bosch-tension magneto, Bosch starting and ball bearings. Bearings are all inside gear case, from which they receive their lubrication, requiring no special attention, and insuring permanent alignment at all times.

The final drive is by means of two short heavy chains, one to each axle, driven direct from the transmission.

Power plant is Buda heavy-duty engine, 4 cylinder,  $5 \times 6\frac{1}{2}$ , equipped with Bosch-tension magneto, Bosch starting and lighting; Pierce governor and

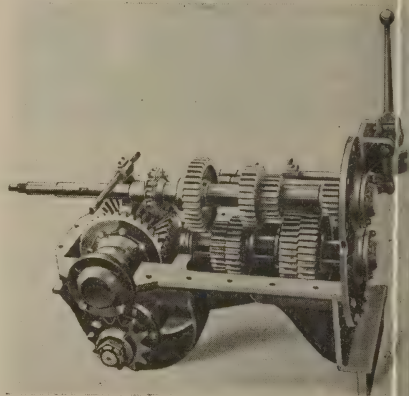


Partially Assembled Transmission Showing Reversing Gearing and  $14\frac{1}{2}$ -inch Final Driving Gear.

Stromberg carburetor. Radiator is Modine sectional core type, cooled by 24 inch fan and protected by heavy steel guard.

Clutch is dry plate type, nine driving discs faced on each side with non-burnable facings. Does not require oiling, and very smooth in action.

Axles are mounted on Hyatt heavy duty roller bearings, with hardened steel sleeves to take the wear. Axle end thrust is taken by bronze thrust plates placed in the axle boxing caps.



Built Up Transmission with Cover Removed

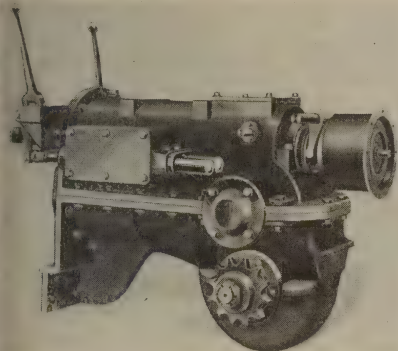
which provide perfect lubrication. Axle springs are  $12\frac{3}{4}$  inch long, so that wheels readily follow uneven track, make easy riding, and give excellent traction.

Brakes are placed between the wheels. Brake shoe covers both tread



and flange of wheel. Lever type of brake rigging is used, producing the same pressure on all four wheels, regardless of wear on wheels or shoes.

Sand pipes hug the rails, placing sand directly on rails. Valve does not



Completely Assembled Transmission and Clutch

slide on its seat, preventing wear. Sand is agitated when valve is opened, insuring positive bow.

The frame is of massive construction and built close to the track. Bumpers are arched so as not to derail cars in rounding sharp curves. The cab and canopy are of all-steel construction, easily disassembled. Cab has side as well as rear entrance, affording greater safety, and provided with wired glass windows.

## Hydro Hoist and Dump Body Price List

Parts Price List No. 2, covering the Hydro hoist and Heil steel dump bodies, is a very complete publication on these lines of the Heil Company. Particular attention is called by the company to the thorough way in which the power take-off assemblies have been listed. The index on page 3 gives the names of the truck or the make of transmission of practically every truck used in the United States. The book is divided into a number of sections, the first devoted to information on the ordering of parts, and the mounting of equipment. Other sections refer to definite parts of the Heil line. Prices on all parts are found in the back of the catalogue in a separate supplement.

In sending out the new catalogue the Heil Company draws attention to the fact that the Hydro hoist power

take-offs have been perfected in every detail. They are made with hardened shafts, roller bearings, case hardened gears, all machined to micrometer size.

Copies of Parts Price List No. 2 may be had by addressing the advertising department of the Heil Company, Milwaukee, Wis.

## One-Man Excavator

The Bay City Dredge Works, Bay City, Mich., has recently published a booklet on the Bay City one-man excavator for sand and gravel pits and light stripping work.

The new catalogue shows the machine and its adaptability to a wide range of work. There are 32 pages in all, profusely illustrated, showing both track type and new caterpillar type machines in operation. These machines are shown handling sand, gravel and crushed stone with both clamshell bucket and shovel type dipper attachments. They are also shown loading into trucks, wagons and railroad cars. The adaptability of this machine for stripping operations is also clearly brought out.

This catalogue is now available for distribution.

## Blaster's Hand Book

A new and revised edition of the Blaster's Handbook, in attractive form, has just been issued by E. I. du Pont de Nemours & Company. It was compiled under the direction of the manager of the company's technical section, and is especially valuable at this time to all users of explosives because it reviews blasting practice in every phase and gives the most approved methods of employing dynamite and black powder based on actual field use.

The book is profusely illustrated, showing proper methods of employing explosives under a great many different conditions. Instructions are given on firing; how to handle a misfire; how to use explosives in road and railroad building; side hill cuts; digging trenches; scrapping heavy machinery; blasting old foundations; and all kinds of quarry, mine and farm use. The subject of the use of explosives in agriculture is thoroughly discussed. How to handle and store them most efficiently is also pointed out.

The book is gotten up in compact, convenient, and permanent form, and is very well arranged.

## H. A. Hutchins Now With Northwest Engineering Company

The Northwest Engineering Company announces that H. A. Hutchins, well known in his former connection with the Thew Shovel Company, has become associated with the main office of the Northwest Engineering Company located at 1220 Steger Building, Chicago. Mr. Hutchins has been with the sales force of the Thew company since 1917 and was district manager of the Chicago territory of that company up to the time of joining the Northwest organization on December 15.

## Road Turntable for Trucks

The Freeman Manufacturing Company of Racine, Wic., offer to users of auto trucks a turntable which permits turning back the truck on a narrow road in a very short time. One of the principle advantages of the turntable is that it occupies but 6½ feet of road and will permit empty trucks to pass by one side of it. It is easy turning, the manufacturers claiming that a child can push it around even when it is loaded with a heavy truck. One turntable fits all sizes of trucks. It is light weight, and may easily be set up in a new position. It works on any reasonable road grade. Can be taken from one job to another on wheels.

Many readers of Pit and Quarry would doubtless find advantage in a piece of equipment that would reduce truck delays in tight places. Detailed information may be secured by writing the Freeman Mfg. Co.

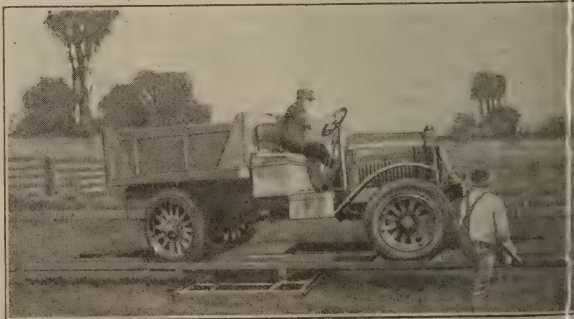
## To Represent Bucyrus at Chicago

The Bucyrus Company, South Milwaukee, Wisconsin, announces the addition to their sales force of Mr. John J. Gault, Asso. Mem., A. S. C. E.

Mr. Gault has had many years of experience as construction and locating engineer, having been assistant engineer on the Chicago and Northwestern, engineer maintenance of way on the Chicago and Alton, construction engineer for the United Fruit Company and assistant engineer on the Chicago, Milwaukee & St. Paul. His last connection was with the International Harvester Company as locating engineer on a railroad project.

He will be attached to the Chicago office of the Bucyrus Company at 622 McCormick Building, Chicago, Illinois.

The distributing plant of the Huron Portland Cement Company, at Detroit, Michigan, was destroyed by fire on November 15th, with a loss estimated at \$250,000. The origin of the fire was not determined.







## SEE IT AT THE GOOD ROADS SHOW

THE illustration shows a Link-Belt Crawler Crane stripping overburden in a sand pit near Gary, Ind., where it has been working on the new road between Gary and Michigan City.

It loads a 40-yd. gondola car heaping full, in 20 minutes, although only equipped with a  $\frac{3}{4}$ -yard bucket.

The Good Roads Show will be your opportunity to see the machine that gives locomotive crane service where there are no tracks.

Other Link-Belt machinery of interest to road builders will include a belt conveyor, a power swiveling wagon loader, and other material handling equipment.

Look us up at the show.

LINK-BELT COMPANY

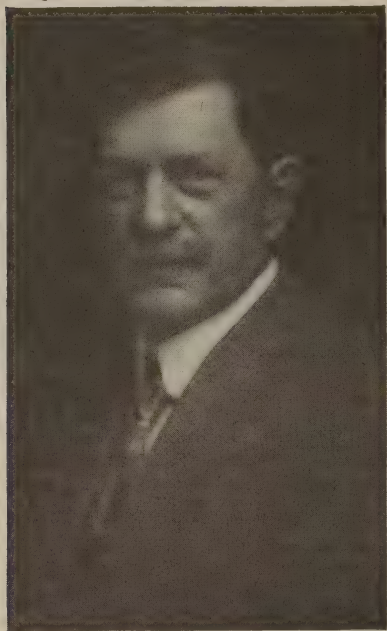
Chicago—300 W. Pershing Road

Philadelphia—Hunting Park Ave. & P. & R. Rwy.

# LINK-BELT

## Founder of Important Local Industry

A recent article in a Louisville paper gives to Mr. W. J. Sparks, president and general manager of the W. J. Sparks Company, producers of crushed stone at Mount Vernon, Kentucky, the distinction of being the founder of the largest industry of Rockcastle County, Kentucky, that of quarrying the fine limestone of the section. The company at the present



time controls operations at Mount Vernon, Mullins, Sparks Quarry and Russellville. The Sparks operations began in 1895 and have enjoyed continued prosperity almost from the beginning.

Referring to the deposit the newspaper says, "The Mount Vernon quarry face has been declared to be the finest looking limestone exhibit in the country. There is a very slight overburden and the stone is of practically the same hue from top to bottom, except for a belt of oolite that can be distinguished at its center. If the rock from the face of this quarry to a point twenty feet back should be 'shot' at one time it would take two years to get it into railroad cars for shipment.

"The limestone is taken from a sub-carboniferous layer. It is not to be confused with the Mississippi limestone which underlies the Bluegrass. This type is harder and less susceptible of erosion. For that reason it is more suitable for the work it is called upon to do than would be the Mississippi stone."

## Electrical Shot Firing Regulations

Wherever it is feasible to adopt electrical shot-firing for either mining or quarry work, this should be done as a safety measure, states L. C. Ilsley, electrical engineer of the Bureau of Mines, in Serial 2405, recently issued. Electrical shot firing, when properly carried out, eliminates some of the inherent dangers of fuse and squib firing. Several states have already, by regulation or enactment, covered the question of electrical shot firing, and the Federal Operating Regulations under the Land Leasing Act make provision for firing from the surface. In order that state law makers and commissions who may contemplate adding such regulations to their existing codes may have a ready means of learning what has been done, a compilation of electrical shot firing regulations has been made. Copies of Serial 2405, "State and Federal Electrical Shot Firing Regulations," may be obtained from the Bureau of Mines, Washington, D. C.

The Holmes Sand & Gravel Products Co., Millersburg, Ohio, has been incorporated with a capital of \$100,000.

Improvements, to cost about \$532,000, on the Duluth plant of the Universal Portland Cement Co., will soon be under way. These improvements will consist of enlarging the coal grinding building, finishing mill, burner building extension and a new raw materials mill. Mr. R. S. Huey is superintendent.

The George C. Lauer Stone and Construction, with offices at 552 Gilfillan Block, St. Paul, Minnesota, is being reorganized. The capitalization of the concern will be around \$75,000, under the new order. This company's quarry, pits and plant are situated at Mendota, Minn.

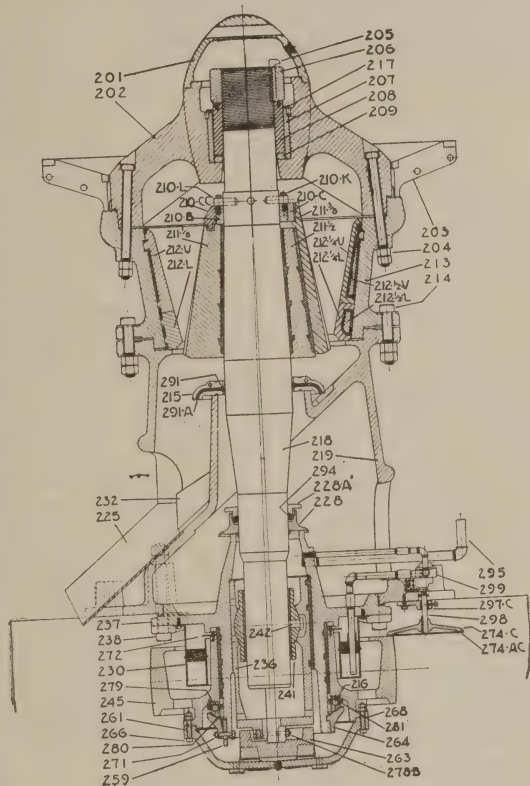


# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- They are noiseless and run like watches.
- 50% greater capacity for same power.
- Practically no wear on anything but head and concaves.
- Short shaft and saving in head room with packed dust collars.
- Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- Can be driven right, left, or standard, as sent from shop.
- Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- Positive circulating oil system through filter and cut geared oil pump.
- Made in our own shop by experts, trained for the job.
- It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- Our fine crusher does the work of 4 geared crushers.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.



**KENNEDY VAN SAUN MFG. & ENGR. CORP.**

20 Broadway

NEW YORK

CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS

## New Ingersoll-Rand Office

The Ingersoll-Rand Company and The A. S. Cameron Steam Pump Works announce the opening of a branch office at 718 Ellicott Square Building, Buffalo, N. Y. This new office is equipped to render full service to those interested in air, gas and ammonia compressors, vacuum pumps, turbo blowers and compressors, condensers, oil and gas engines, pneumatic tools, rock drills, centrifugal and direct-acting pumps and other of the numerous products manufactured by these companies.

## Now at Toledo

The Austin Machinery Corporation has consolidated the main sales office at Chicago with the engineering and production departments at 3500 Dorr street, Toledo, Ohio.

This is just one more step toward the unification of affairs of the company to increase service in all its branches.

It lends dispatch to the handling of orders for both machines and repairs. It is believed that it will be of mutual benefit to both the Austin organization and its many customers.

However, a branch sales office will be maintained at Chicago, Suite 603, Railway Exchange Building, for the convenience of customers in, and near Chicago.

## Stock Houses for Cement

The Bland Engineering Company of Minneapolis is making a specialty of the construction of stock houses for the storage of finished cement.

These people state that the avoidable loss through inadequate storage and packing facilities in these industries, amounts in many cases to 5 per cent of the total cost of production.

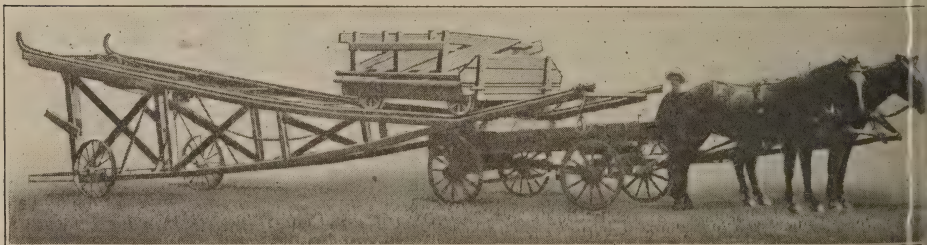
The company handles construction

work of this nature in every section of the country and its methods are standardized, and accomplished with the use of equipment designed and built especially for this work.

A book which was recently issued by the company and which will be sent to anyone without cost, describes the methods in detail and shows illustrations of stock houses which this company has erected.

## New Material Loader

Something new in the way of gravel loaders is offered to the trade by the Stiles Manufacturing Company of Bolivar, Mo., in their new "single line" loader here illustrated. This loader is intended to be used in connection with scrapers, and takes care of the work of elevating and dumping into trucks material from a stock pile or earth from a stripping operation. The manufacturers claim that, dependent on the number of vehicles hauling, the single line loader takes the place of 35 to 50 men with shovels. With two teams operating scrapers, and one operating the elevator car, the "single line" loader will load a truck or wagon every 1½ to 2 minutes, a load in this sense meaning a yard or more of material. The actual time required to operate the loader averages about 35 seconds. There are no gears, chains, belts or buckets included as a part of this piece of equipment. One line of rope, a small car and a number of wheels are its only moving parts, and these are in motion only when actually working. The manufacturers claim for the loader that it can be set up ready for work in 5 minutes. As shown in the photograph it may be transported from one location to another by attaching it to the end of a wagon. Full information on the gravel loader may be obtained by addressing the Stiles Manufacturing Co., Bolivar, Mo.





# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lim

VOL. 7

CHICAGO, ILL., FEBRUARY, 1923

No. 5

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**J. J. FITZGERALD**, Associate Editor



*Model 42 Barber-Greene Bucket Loader in the yard of the Oakland Building Material Company, Oakland, California*

## Making the Most of the Eight-Hour Day

The Oakland Building Material Company some time ago found that with one Barber-Greene Bucket Loader and one operator they could replace two old loaders, of another design and type, and their two operators.

In an eight-hour working day on December 15, the Barber-Greene made a record of 105 four-yard truck-loads. In addition, when one of the trucks became mired and sank hub-deep into mud, the Barber-Greene was run into the mud and pushed the truck out to better going.

Naturally, the users are delighted with the loader. They feel certain, too, that the present record for getting the most out of an eight-hour day is only a beginning.

Hundreds of other users of Barber-Greene Bucket Loaders and Portable Conveyors have reported similar gains in speed and economy—both as against other mechanical equipment and as against hand methods—in handling building materials either at the pit or quarry, in the yard, or on the job.

We will be glad to mail on request our Catalog N together with cost reports covering the experience of other users.

**Barber-Greene Co., 490 W. Park Ave., Aurora, Ill.**

*Offices in Thirty-three Cities*

**BARBER GREENE**  
 Portable Belt Conveyors  Self Feeding Bucket Loaders



# Pit *and* Quarry

Vol. 7

Chicago, Ill., February, 1923

No. 5

## Atmosphere Clarified

FOR some time trade associations have been asking what they might and might not do—and no one seemed to know the answer.

Things which the Government asked them to do in time of war the Government has later prosecuted them for in time of peace—such as the districting of the producing area of the country, which was one of the counts against the Gypsum Industries Association, a decree in which case was entered January 3.

Trade organizations generally will therefore feel themselves greatly obligated to the Gypsum Industries Association (now reorganized as The Gypsum Industries) for pushing the case to an issue and consenting to a decree which defines without possibility of misconstruction the rights and limitations of such a group.

Here, then, are the things for which manufacturers in any one line may properly organize, as expressed in the gypsum decree:

(a) To advance or promote the use of gypsum products by research, publicity, advertisement and any other activities of like character.

(b) To deal with engineering and trade problems pertinent to the industry for the purpose of advancing the use of gypsum products.

(c) To carry on educational work pertinent to the industry by fellowships in various schools and colleges for research; experimental and research work in and through institutions of learning, scientific bureaus and societies; and to provide for lectures and the writing and reading of papers upon subjects pertaining to the industry.

(d) To maintain a traffic bureau to furnish traffic information upon specific request from published freight tariffs lawfully issued by the carriers, and to assist the industry in transportation questions before Federal and State Commissions and other bodies dealing with questions of transportation and with common carriers.

(e) To deal with improved methods of plant and mine operation including sanitation, safety appliances, accident prevention, labor, plant and mine development, housing conditions, insurance and methods of accounting.

(f) To maintain a credit bureau for the sole purpose of furnishing credit information.

And on the other hand here are the things such associations are enjoined and restrained from doing:

(a) Agreeing to fix or establish by agreement among themselves the prices to be charged for said gypsum products.

(b) Agreeing among themselves in any manner whatsoever to charge purchasers of said gypsum products uniform prices or doing by agreement any act or acts which will result in maintaining uniform prices.

(c) Agreeing among themselves in any manner whatsoever to advance or decrease prices for their products to purchasers thereof.

(d) Agreeing among themselves in any manner whatsoever to advise or communicate with one another as to proposed advances or decreases in prices for their products to purchasers thereof or agreeing among themselves in any manner whatsoever to circulate among themselves in any way information concerning or relating to such proposed advances or decreases, or to the prices charged or to be charged.

(e) Doing any act or acts by agreement among themselves which will result in advising or communicating with one another as to proposed advances or decreases in prices for their products to purchasers thereof or in circulating by agreement among themselves information concerning or re-

lating to such proposed advances or decreases.

(f) Agreeing among themselves in any manner whatsoever to limit, curtail, restrict or otherwise control the amount of said product to be produced for manufacture at any time by any or all of the defendants or by doing by agreement among themselves any act or acts which will limit, curtail, restrict or otherwise control the production or manufacture of said products by any or all of the said defendants, such as the withdrawal of salesmen from a certain territory over stipulated periods.

(g) Agreeing among themselves in any manner whatsoever as to the territory in which any or all of the defendants may sell or otherwise dispose of their products.

(h) Agreeing among themselves in any manner whatsoever to effect any discrimination of any character, whether in prices charged or otherwise in favor of or against any purchaser of their products by reason of the fact that such purchaser is a mail order house, purchasing agency, cooperative buying association or so-called "Dealer," or for any other reason or doing any act by agreement among themselves to effectuate any such discrimination in favor of or against any purchaser for any reason, except of course that each defendant may independently of the other defendants select his or its own trade and dispose of his or its products to such persons and on such terms as he or it may choose.

(i) Agreeing among themselves to use a published credit list and credit information for the purpose of black-listing an undesirable purchaser or for the purpose of putting the name of the purchaser on such list with the intent of the manufacturer who submits the name reserving the purchaser's business for himself.

(j) Agreeing to fix, establish, or maintain by agreement among themselves the terms, differentials, discounts or prices which should be followed by a dealer, jobber, or other middleman upon his re-sale to a consumer or by any such agreement the uniform discounts which should be subtracted by each manufacturer, as an inducement for cash payment.

(k) Agreeing among themselves to adopt or follow any price list, published or compiled, or caused to be published or compiled by themselves or by any

newspaper, trade paper or periodical as a fixed price.

(l) Agreeing among themselves to enforce any arbitrary freight rates in excess of those lawfully made.

(m) Agreeing among themselves that certain individual manufacturers engage in the manufacture of a certain gypsum product of a certain definite composition, and that all other manufacturers desist from manufacturing a product of such composition.

(n) Aiding or abetting or assisting individually or collectively others to do all or any of the matters herein set forth and enjoined and restrained herein.

(4) That nothing herein contained shall be construed to restrain or interfere with the action of any of the said defendants, acting with respect to his or its own corporate or individual business property or affairs, or furnishing necessary information to their own customers in connection with bona fide sales of such products, or individually doing any of said acts or things done in good faith to meet competition when such action or the furnishing of such information is not made or done in concert or as the result of any agreement among themselves, or to save any patent rights of any of said defendants; and that this decree and any of its provisions of the entry thereof shall be without prejudice to the rights or interest of any of the said defendants in any proceedings which may be brought by or against them or any of them, except only any proceedings in this cause to enforce the terms of this decree.

The Easton Car & Construction Co. of Easton, Pa., has recently opened a new office in Harrisburg, Pa. This office will be under the personal supervision of Mr. Geo. D. Fraunfelder.

The Trinity Gravel Co. of Dallas, Texas, has been incorporated with a capital of \$300,000. The incorporators are: D. G. Smith, D. S. Hartson and L. S. Brotherton.

The Neal Gravel Company of Mattoon, Ill., has purchased a gravel plant near Summit Grove, Ind. Including the production of this new plant the company has a daily capacity of about 85 cars of sand and gravel. H. F. Neal is general manager of the company and J. P. Cantlon is in charge of the sales.



## Will the Alien Labor?

“**R**UNNING a republic takes a lot of talking, and it is a pity that a large and influential thinking class would sooner wear a muzzle than assume its proper position in the chorus,” says Mr. Charles Piez, president of the Link-Belt Company.

“Don’t be afraid of a few mistakes. Mr. Bryan has survived a lot of them. And don’t be afraid of names. You are too practical to be called high brows, and too intelligent to be called intellectuals.”

This is the way Mr. Piez got a grip on his audience at a recent banquet of the Engineers’ Society of Western Pennsylvania, in Pittsburgh.

Then he started to tell them some of his views on labor and immigration. Not all of them will meet with whole-hearted support by those who demand foreign labor without regard to any considerations of a broader national character. But in the main we believe Mr. Piez has said something which the country needs to hear. Read these extracts:

You may not be conscious of it, but even in these days when industry is running at not over 75 per cent of capacity, common labor is hard to get.

Congress, remembering that America had a very large number of unassimilated aliens to embarrass it during the war, and recognizing that post-war conditions in Europe might lead to a very considerable increase in this number, has placed restrictions on both the number and character of immigrants.

Congress was sound in its intent, and though I am conscious that the lack of pick and shovel men is an embarrassment to industry, I question whether unrestricted immigration is not a more serious embarrassment to the nation.

We can’t build up a strong, homogeneous nation by admitting large numbers from racial strains that have shown no capacity to adopt American ideals, and no ability to rise to the responsibilities of American citizen-

ship. But if we find restriction desirable, even in the face of urgent industrial demand for men willing to work, why impose a literacy test that admits the Red propagandist, who can read but won’t work, and excludes the man who wants to work and can’t read? Why admit the peddler to still further congest our cities and add to our social overhead, and exclude the peasant who would join our producers? And why, above all, do we cut out desirables by assigning part of our admissible quota to lands which contain too large a percentage of undesirables?

If public policy will prevent Congress from meeting the needs for industrial labor by removing the restrictions on immigration, then three steps should be taken:

1. Congress should be asked to modify tests so that none except those that come here to work will be admitted. Let our immigration authorities advertise for labor in countries that have furnished us with readily assimilable material for citizenship in the past, examine them for the necessary tests before they embark, and then dispose of them quickly when they arrive at Ellis Island.

2. Improve industrial methods and enlarge the application of labor aiding machinery, so as to release labor for transfer to industries in which labor-saving machinery cannot be readily applied.

3. Find some method of improving conditions in industries that are known to be over manned, so that the surplus labor may be diverted to industries that will offer better opportunity for employment.

The first of these three steps could, I believe, be solved promptly if Congress could be convinced of the real needs of industry, and could be presented with a plan that would meet that need within the restrictions as to the number of immigrants annually admissible.

The second step depends largely on the ingenuity of the engineering profession in improving processes.

Regarding his third suggestion, Mr. Piez took the most obvious example, that of the coal industry, and showed how over-development is not only using too many men, but too many cars as well.

## Local Materials

ONE of the important topics taken up at the recent convention of the American Road Builders' Association was that of the use of local materials. Mr. Vernon M. Pierce of the U. S. Bureau of Public Roads was one of the speakers on this topic, with a paper on the following day by Mr. H. J. Kuelling of the Wisconsin Highway Commission.

Mr. Pierce spoke particularly on the use of deposits of various inferior materials, such as are not usually sold commercially for road building purposes, and advocating their use in localities where regular commercial materials are not available. He did not try to argue that these would make a road equal to the recognized standard materials, but that through their use some localities could have roads where otherwise the cost would be prohibitive. He gave also several suggestions as to how these local materials might be used, especially recommending some of them for bituminous macadam roadways.

The paper was not one to which any one, even a commercial stone or gravel producer, might take serious exception, inasmuch as these were recommended simply as local expedients, and temporary expedients at that, giving way perhaps to permanent surfaces of better types as the localities become able to pay for them.

Mr. Kuelling chose as his topic "How to Equip and Operate Local Gravel Pits to Produce Concrete Aggregate." Mr. Kuelling has grown to be an enthusiastic champion of this method of securing road building material, and states in this paper that nearly 24 per cent of the aggregates used on the 355 miles of Wisconsin highways, put in last year were taken from local deposits.

Mr. Kuelling has in the pages of PIT AND QUARRY about a year ago presented some of his ideas on this

subject, and somewhat earlier than that we ourselves presented in these pages the result of our investigation in Wisconsin, showing a number of cases in which the use of local material had not been satisfactory either from the standpoint of quality of materials, sufficient and regular delivery, or low cost.

He admits in the present paper that commercial pits and quarries can produce cheaper than a temporary local plant, and advises using them where the question of freight does not enter and the difference in truck hauls is not too great. Mr. Kuelling has made undoubtedly a very strong statement of his case in this paper, but it is, of course, all on one side of the question, and does not take into account the greater expense of investigation and oversight on the part of the Highway Commission, or the reluctance with which contractors will enter into contracts to use local materials where the deposit is not already opened up and well known, or where they themselves are expected to become material producers as well as contractors and open up the deposits themselves.

Of course, we cannot overlook the fact that Mr. Kuelling is interested in seeing roads built, and is perfectly justified in keeping this end in view rather than making the highway system of the state subservient to the commercial material producers. It is to be regretted, however, that the Highway Commission has seen fit to go into this matter so extensively. We feel that the commercial producers themselves would have been more responsive to the needs of the commission and would have themselves opened up new deposits had sufficient encouragement been given them. We feel, too, that the natural tendency will always be to scrutinize the product of a local quarry or pit less carefully and to require less of it than would be required of a commercial producer.



The inferiority of roadways which will thus result must also be taken into account as one of the expenses to be charged against any saving in freight rates or other savings which Mr. Kuelling may be able to figure out. We feel that the roadway itself is the thing to be looked after first, and that the inspectors employed by the commission should be instructed to require the same standards in materials at all times irrespective of their source. We believe such a requirement as this would of itself condemn some of the deposits which have been opened up, and would put the whole situation in quite a different light.

So many agencies have been working together within the last few years to obtain a high quality of concrete pavement, this quality depending so largely on the quality of the materials which enter into it, that it seems a pity to have anything occur now to lower these standards.

### It's a Big Industry

IT WAS an intensive "road building" week—that third week of January, when the Road Show was on, and various conventions, more or less related, met in Chicago. One could not imagine a better clearing house for information, and the preparation for an active and intelligent construction season.

Engineers, contractors, machinery manufacturers, material men, all have their innings at these times; and the fact that they can all get together to help in the common good is one of the biggest features of the whole program.

This year's Show was the biggest, the most informative, the best attended, the most remunerative to the exhibitors from a sales standpoint. It demonstrated a number of things, not the least of which is the wisdom shown in putting it on a sound business basis.

Not every exhibitor got all the space applied for—which is far better than having a number of empty booths, even though some have to be somewhat disappointed.

But what a revelation it was of the progress of the road-building industry! From the production of the materials to the smoothing of a completed concrete road—every process was represented, with machines to accomplish each operation. It's a big industry!

### A Record

PRELIMINARY figures just issued place the production of Portland cement for 1922 at 113,870,000 barrels. This is far and away the largest production in the history of the industry, and if the final figures bear out this first approximation it is above our optimistic November prediction of 110,000,000 barrels. At any rate it is a record to be proud of. Many deductions can be made from it—for instance, that we are finding our stride and are keeping more closely abreast with our increasing highway program. And we have not yet put our cement plants to the limit of their capacity. Cooperation of all parties concerned will help us to set a new record this year.

### "Sign Here!"

THE various national associations are for the most part committed to definite membership drives. These are born of a confidence in the worth of the work they are doing, and knowledge that only by 100 per cent cooperation can 100 per cent results be attained. Join! Do your bit! Get your share of the benefit! For we are here to tell you that this benefit is not hypothetical. It is not coming at some indefinite time in the future. It starts as quickly and serves you as definitely as an insurance policy. Get busy! Get in!

# Washington Convention

## Sand and Gravel Men in Three Days Session—Dann Reelected

The seventh annual convention of the National Sand and Gravel Association, held at the Raleigh Hotel, Washington, D. C., on January 24, 25 and 26, will be remembered by the large number of representative sand and gravel producers who attended as the best gathering of the national body that has yet been brought together. As such it was prophetic of the growth and greater usefulness of the organization under whose auspices it was held and presages other and greater conventions of a well organized and smoothly functioning association.

The sessions were opened on Wednesday morning by President Alex Dann, who, with no preliminary flourish, placed before the membership the reports of the past year and spoke of the activities that will fill out next year's programs. Before taking up the topics that formed part of his own report, Mr. Dann distributed the printed reports of the executive secretary and the treasurer. Mr. John Prince, treasurer, was unable to be present and Mr. Dann made on his report the comments that would have been made by Mr. Prince himself, though he drew attention to Mr. Prince's efficient management in a way that that modest gentleman himself would not have done.

### Better Financial Condition

The outstanding features of the paper were that it showed a healthier financial condition because of reduction in expense, this in spite of a decreased income as a result of the discontinuance of a number of memberships earlier in the year. Many of these who dropped out, Mr. Dann said, later rejoined. There is a much better spirit about the payment of dues. Mr. Dann stated that this very satisfactory report confirmed his belief that the membership of the National Sand and Gravel Association would increase 50 per cent during the coming year.

Mr. Dann here called attention to a change in the program. The members attending were to have been presented to President Harding on Wednesday morning, but the President's illness prevented this and it was necessary to

defer the visit to a later date, contingent upon Mr. Harding's recovery. This brought about a change in the order of speakers and C. C. Griggs, chief of the Nonmetals Valuation Section of the Department of the Interior, who was slated to appear Thursday afternoon, was called upon.

Mr. Griggs prefaced the reading of an interesting paper by the statement that it was occasionally the work of his division to give information of a general nature on the methods of figuring the worth of a natural deposit for purposes of development; that in these cases he did not know the names of the companies or the locations of the deposits, the problems being usually proposed as hypothetical cases by interested parties; that reference in his paper were to such deposits, about whose location or ownership he knew nothing.

The paper referred first to the misunderstanding that frequently exists about the activities of the government departments interested in checking up tax returns and to the attitude of sections of the press on government tax collection methods. The idea would get abroad quite easily, particularly with encouragement by the press, that Uncle Sam had an army of hawk-eyed sleuths ever ready to cause unnecessary annoyance to taxpayers. This is not the case. The government has to exercise care, of course, but no more than one would expect from a large business concern which is keeping a complicated system in working order.

### Valuation of Deposits

Allusions to a number of cases in which Mr. Griggs was furnished data, but no information on ownership or location, showed the important work the Nonmetals Valuation Section is doing. In one case a broker intending to handle a bond issue on a company that put a value of 10 cents per ton on limestone in the ground was convinced that the limestone bearing land had no value except as raw land. In other cases, producers were shown how to calculate the value of their deposits and how to figure off depletion on them. The slight value of leaseholds



in establishing valuation figures was touched upon, as was the great value of an appraisal, properly made and constituting more than a mere opinion. Values of deposits cannot properly be calculated on information as to royalties, for values are actual and royalties are matters of agreement. The "discounted earnings method" was explained and it was shown why it did not apply in calculating values and depletions of nonmetallic mineral deposits. It works out satisfactorily in the cases of mines producing valuable minerals from small deposits. It involves the employment in calculations of a "risk rate" which, in the case of sand and gravel deposits, results in the showing of no value at all in the deposits. Sand and gravel deposit values can be computed without resorting to such theoretical methods.

Depletion figures allowed on the average nonmetallic mineral deposit run about 2 per cent of the selling price. Limestone is allowed 1 cent per ton, sand and gravel 1 to 1½ cents per ton, glass sand about 6 cents per ton, molding sand from 6 to 10 cents per ton.

Mr. Griggs thinks it should be possible at some later date to compile from the data collected by his division a tax rate figure that can be applied to the figure representing the gross profit of any particular industry, the result being the tax due with depletion, depreciation and all other items figured in. He hopes some day to see such a plan put into effect.

### Coming Activities

After the reading of this paper, Mr. Dann continued his report, with particular reference to the activities of the association for the coming year. He said the association should have a fund of \$10,000 to enable it to branch out into new activities. During the past year the paramount activity was transportation. All producers were considerably hampered by difficulties along these lines, but were saved from worse troubles by the fine work of Mr. Barrows during the year. The Washington office was also of great assistance to producers in straightening out tax matters. In this they were greatly helped by government authorities. The wayside pits caused a lot of trouble. Mr. Dann showed that, while it is not axiomatic that all wayside pits material is below grade, most of it is apt to be. It is necessary to advocate the use of good material, not loudly but consistently.

There were some differences of opinion as to association activities last year. Various members thought the organization should not do work along one or another of the following lines: giving tax advice, helping in transportation difficulties, fighting wayside pits, or advocating the preparation of better material. Mr. Dann asked the membership to let the officers know what the association should do. He thought it was quite necessary to keep the Washington office busy on these matters. The ever increasing centralization of governmental activities requires adequate representation in the place where the government affairs are conducted. The association, if authorized to do so, could engage in many beneficial activities. It could employ a high class promotional man and a skilled engineer, these men to travel from plant to plant and help to advocate the promotion of sand and gravel and help the producer with his mechanical and engineering problems. The association could found investigational and information bureaus to co-operate with other associations and find new and broader uses for sand and gravel. It could go into the work of developing standard cost accounting methods and helping producers to apply them. The association has given valuable assistance along these lines but has never had an opportunity to devise standard methods.

### Wayside Pits

After this began open discussion on the methods to be used in combating the use of wayside pit material. It was given a definite direction by the accounts given by Mr. Shieley of St. Paul and Mr. Fletcher of Des Moines of the ways in which the wayside pits were hurting their businesses and of the way in which they were fighting back. Mr. Shieley passed out samples of blotters carrying arguments against the use of inferior sand and gravel and for the use of clean materials. At his plant he has to turn out sand and gravel that must come up to rigid specifications, yet very doubtful wayside materials go through. Mr. Fletcher is held to 1/10 of 1 per cent of impurities, although wayside materials containing 5½ per cent of clay are also used. Mr. Sutton of Indianapolis said that associations in neighboring states should work together and that the national body should work with the Bureau of Public Roads and the American Society for Testing Mate-

rials. Mr. Smith of Memphis said that the attack should be along educational lines. Photos of bad spots of road made with wayside materials should be taken and held up as horrible examples. Well prepared literature should be distributed freely. Mr. Donnelly referred to the political discrimination which frequently hampers sand and gravel producers. Mr. Shieley told of how, when a good deposit is opened up along a road and material taken from it proves satisfactory, the pit gets a reputation. Material taken out later and used for other purposes on the reputation of its earlier use brings gravel into disrepute.

In the afternoon the membership took up the open discussion of the association's program with respect to reintroduction of Senate Bill 690 and also with respect to steps that should be taken to improve the industry's car supply. A number of illuminating expressions came from various producers. Mr. Sutton, Mr. Dann, Mr. Chandler and Mr. Donnelly spoke on the related topics and undoubtedly helped to clarify the situation for some of the men present. Mr. Sutton suggested that a bill similar to Senate Bill 690 be arranged for introduction in the House of Representatives.

### Hoover Looks Ahead

At this point Mr. Herbert Hoover was introduced and for some half hour thereafter the members had the privilege of hearing a really big man tell simply but expressively of some of the things that are in store for business in the immediate future. He said that, if the United States were separated from the rest of the world, it could be said to be in a very prosperous time. There is comparatively no unemployment and productivity is high. We are recovering rapidly from the effects of the war and the commercial depression which followed it, more rapidly than Mr. Hoover at one time thought we could. Europe, too, is beginning to show the greatest signs of progress in years. Unemployment there is decreasing and all the signs of an early economic recovery are visible. The fiscal situation in some parts of Europe is the one feature of retrogression. American industry is not dependent upon Europe; American agriculture, on the other hand, has important markets there. Mr. Hoover says it is impossible to make any forecast on the European disturbances, but does not believe they will be serious.

He dwelt on the subject of trade associations long enough to tell of the efforts of the Department of Commerce to build up a spirit of co-operation between the department and the various trade bodies. He is seeking to extend the usefulness of the service, statistical and otherwise, that the department is carrying on, so as to enable business men to form more accurate judgment. He then extended an invitation to all the members to visit the Department of Commerce and thus get a better idea of the work it is carrying on.

### He Answers Many Queries

After this Mr. Hoover offered to answer questions on matters falling under his jurisdiction. His offer was accepted by quite a number of men and the following questions and answers came up. (It must be remembered that PT AND QUARRY gives here the sense of each question and answer, not its exact wording.)

"What are your views, Mr. Hoover, on the transportation situation? It is very important to us and we were discussing it just before you came in."

"Transportation has been falling behind the rest of the industries of the country for 10 years. There is a continuous shortage of facilities. The roads have not kept pace with American industry. The car shortage is due more to shortage in motive power and terminal facilities than to any other causes. The country has apparently decided to regulate rates by law. The establishment of rates by state bodies is almost universal and the national government is also doing this to a great extent. We should be logical and follow out this practice of rate regulation by government agencies to its conclusion—we should obtain a consolidation of the roads and thus do away with rate competition. A considerable number of the railroads are earning less than 1 per cent on invested capital and this 'weak railway' problem is a serious one in American railway practice. Again consolidation is the only solution. We should begin rapidly to bring about the consolidation. When rates were increased some 40 per cent during the war certain inequities between primary and secondary products became greater. A high priced suit of clothes, for example, could be shipped across the country at only a few cents for very short hauls, almost prohibitive. There should be lower rates on primary (basic raw) materials and higher rates on secondary materials."



The rate structure would be enormously simplified if consolidation could be brought about and many inequities would disappear."

"Would the pooling of cars help any?"

"The cars are already pooled, in a way. A regularly organized pooling arrangement would not help much."

"Would the strong roads take over the weak roads, and thus make consolidation possible?"

"The question of compulsion would be a big one, biggest in the East. The sentiment of the West is more for consolidation and it is advocated more there."

"How can available railroad facilities be distributed to get away from the recurring shortage of open-top cars during the coal shipping season?"

"There is, of course, a reasonable fluctuation in coal production and demand and the roads would have more work at some times than at others, under any arrangement. But, if the railways could be induced to move their own coal during the off season, this would account for a third of the coal to be handled and would thus leave more cars during the winter season. Also, the stocking of coal regularly during the whole year would help."

"Will the government continue to further the good roads movement?"

"I have heard nothing to the contrary and assume that the programs as laid out will be carried through."

"In the new building code being prepared by the Department of Commerce, will sand and gravel specifications be set down?"

"The idea of the building code is to help to simplify the small dwelling problem and is being prepared as a result of a great many requests for such a publication. Competent engineers, architects, and men in touch with material problems were consulted. If there is anything objectionable in the code, the department will be glad to hear of it."

"What could be done to get into use, for the hauling of sand and gravel, cars that frequently wait around for 5 days a week in railroad yards, before being sent to mines?"

"We should have no coal priorities on railroad cars. Priorities give too many opportunities to coal speculators. If we had adequate transportation facilities or an adequately organized

transportation system there would be no coal problem."

"Why are sand, gravel, and crushed stone men forced to pay demurrage charges on cars held a few days, while coal operators are not?"

"I have no argument to offer, and I do not know if I can solve it by the consolidation theory. I am going to think it out along that line."

Mr. Hoover, in leaving, expressed the hope that he would have an opportunity through the Department of Commerce, to help producers, and asked that they call at the office.

### Immigration Discussed

Mr. Otho M. Graves of the National Crushed Stone Association called at the meeting with other members of the immigration committee appointed at the annual convention of the National Crushed Stone Association in Chicago the week before. On invitation of the chairmen, Mr. Graves gave an account of the experiences of the immigration committee. He told of how they had come to Washington to try to get a hearing before the House and Senate Committees on Immigration and explain to them the difficulties under which a restricted immigration program puts crushed stone producers. This is the root of the whole difficulty about labor shortage. The stone men found the House Committee in session and the hearings closed. They were, however, given five minutes. Mr. Schmidt, president of the National Crushed Stone Association, took one hour and five minutes. The stone producers' judgment is that the House Committee contemplates even stricter immigration laws. They did not see the draft of the proposed bill, but came away with the idea that the House Committee seems to think that the country cannot assimilate even the allowed 3 per cent yearly. The Senate Committee showed more sympathy. It seemed fairly well divided, but with no set opinions. The stone men also called upon several senators and representatives. They now propose to get members to write personal letters, asking members of Congress to use their influence to secure a wise broadening of the immigration laws. Mr. Graves asked that the gravel men do the same, as individuals and as an association. Mr. B. D. Pierce, Jr., chairman of the stone men's immigration committee, also voiced this view.

### Dann Reelected

Mr. Smith then gave to the meeting the nominating committee's recommendations. All nominees were elected unanimously. They are—President, Alex Dann; vice-president, E. G. Sutton; secretary-treasurer, John Prince; directors-at-large, Harry Donnelly, V. O. Johnston, J. E. Carroll.

On Thursday morning the first speaker was Mr. DeGroot of the Interstate Commerce Commission, appearing for Clyde E. Aitchison, who was on the program as the representative of the Commission, but was prevented by sickness from appearing. Mr. DeGroot began his talk by reference to the heavy business of 1922. Although interfered with by the coal and railroad strikes, this business was remarkably good. He briefly reviewed conditions during the year from a transportation point of view, touched upon car shortages caused by the deterioration of equipment while the shops were closed and by massing of cars in the non-union coal producing centers. In spite of these difficulties much more sand and gravel was hauled than in 1920 or 1921. Shipments compared with 1921 as 16 to 13, with 1920 as 16 to 11. A gain in sand and gravel shipments is that producers usually load up to the car capacity. Service orders 22, 23 and 24 appeared on July 25th. Of these orders, 22 is still in force, 24 was cancelled and 23 was done away with by 25.

### Car Supply Prospects

Mr. DeGroot in speaking of 1923 prospects, referred to comparative 1923 figures. He showed how, on July 1st, 1922, there were 14.3 per cent of all cars in bad order, on August 1st, 15.3 per cent in bad order, on January 1st, 1923, 9.5 per cent in bad order. Engines, which, with only a little inattention, will rapidly run down, also showed a much smaller proportion on the bad order list in the latter part of 1922. The roads ordered or installed or had building operations begun on 145,000 new freight cars and 2,824 new engines in 1922. All this equipment will be installed in 1923 if it is not already done. If in 1922 the sand and gravel industry could ship its greatest tonnage, why is it not reasonable to suppose it will do much better in 1923, when there will be more new equipment and less of the old equipment in bad order.

There are indications of a perman-

ent settling of the coal disputes, no troubles in the steel business are expected, informed people are not looking for any more railroad labor troubles. The indications are that, if all will pull together properly, shippers and carriers, a big year is in prospect.

Exclusive of coal the total loading of all commodities in 1922 exceeded 1920 loadings by 3.1 per cent. In 1920 excluding coal, 35,036,022 cars were loaded, in 1921 this dropped to 31,347,816 cars, and in 1922 came up to 36,265,178 cars.

Answering a number of questions, Mr. DeGroot brought out information on a number of points. The Interstate Commerce Commission has just concluded its hearings on mine ratings, the distribution of cars between mines, and the use of unused cars.

Well informed men differ on the question of railway car pools. The matter of repairs to cars presents the greatest difficulty. Many differences of opinion exist as to the extent of use without regard to ownership. The holding of equipment during periods of heavy car service is a point that offers much room for disagreement.

Cars and engines are being ordered rapidly. Builders are not booked up to capacity but expect a very prosperous year.

### Geologist Talks

Following Mr. DeGroot was Dr. George E. Ladd, economic geologist of the Bureau of Public Roads, who treated the membership to some reminiscences of an experienced geologist on the subject of sands and gravels. Doctor Ladd's interest in sand and gravel has always been that of the geologist, not of the producer, but he knows many producing problems and has always been more or less closely connected with producers. He told of his early work in this field in New England, the South and the Middle West and ventured the statement that he had probably been interested in sand and gravel more than any man there present.

A few years ago Doctor Ladd began the conduct of a survey of sand and gravel plants and deposits of the United States for the Bureau of Public Roads. For some reason or other this work was discontinued and Doctor Ladd ordered to take up studies of certain road building problem for the Bureau.



Doctor Ladd also conducted surveys of crushed stone plants with particular reference to general economic features. Much useful information was secured and the investigators became able, after a time, to tell after brief inspection, just where the end of a particular operation would stand. In one case, he was able to recommend changes in operating plans which reduced the operating expense by one-half. There were in vogue about numerous stone plants a good many inefficient methods. Doctor Ladd has little doubt, as many operators have little doubt, that a very high proportion of sand and gravel plants are operating under very inefficient methods, and would, if relieved of these methods, make considerable more profit.

Following Doctor Ladd's talk two motion pictures of the United States Bureau of Roads were shown. The first of these took up the story of the early survey work, and the activities that are carried on up to the time the actual concrete or gravel surface is constructed. The second film showed the building of a modern concrete highway from the time materials are sent to the job to the time the finished road is ready to bear traffic. All the operations were faithfully depicted and in some detail. The pictures were well received by the membership.

### Shiely in Motion Pictures

After the government pictures came a 1200 foot film showing the gravel and crushed stone plants of the J. L. Shiely Company of St. Paul, Minn. to Mr. Shiely, who talked on the film as it was being run, we make haste to record the distinction of being the most efficient advertiser of mineral aggregates that we have ever met or heard of. Earlier in the convention he gave some indication of his activity along promotional lines, but his film is the best word in the advertising of sand, gravel and crushed stone. It shows, in general, the operation of the two plants; but it accomplishes more than the mere description of operations, it shows the importance of employing such an operation to secure materials for use in concrete. The film is consequently an effective weapon against the ever-encroaching wayside cut. The effect on the men in the hall at the time was noticeable. They all saw the value of the idea and deluged Mr. Shiely with questions on costs, methods of securing such pictures, and

other features of the work of producing such a film. We will bet even money that other producers will adopt the idea.

Mr. Pilcher, appearing after Mr. Shiely's film had been run, talked of types of road, principally bituminous, other than the ones built of concrete, crushed stone or gravel. Mr. Pilcher's address was short, but very much to the point.

During the noon hour the gravel producers met at a complimentary luncheon given by the Association to members and their wives. Music of a very superior order was furnished by the hotel orchestra and this, together with the very fine meal, made the occasion a most enjoyable one. Business was forgotten for the time being and all devoted themselves to the occupation of having a good time.

The first speaker on Thursday afternoon was the Hon. John G. Cooper of Ohio, a member of the Committee on Interstate and Foreign Commerce of the House of Representatives. Mr. Cooper opened his talk, which was largely on transportation, by referring to the too-prevalent practice of going to Congress with everything that needs attention, of making worse the condition that exists today in which it is attempted to cure everything by legislative action. What we need, the honorable gentleman said, was to bring about a change for the better by discharging more fully our individual duties and responsibilities.

### Opposes Labor Board

Mr. Cooper is opposed to the continuation of the Railway Labor Board.

"The 'one big union,' whether it be among employers or employees, is dangerous to our Government and the public interest, and that is the chief reason why I oppose such tribunals as the Railway Labor Board," he said. It encourages the spread of mass action among the workers on the one hand and the formation of gigantic combinations of capitalistic interests on the other hand. It prevents friendly co-operation and the practice of the square deal between the managers and men, and it feeds more and more fuel to the devastating flames of class hatred and prejudice which are such a grave danger to the American life of today. It destroys the teachings that all men should be given equal opportunities to advance to higher places

according to their integrity, ability, and industry.

"I am of the firm opinion that controversies and grievances arising between railway managers and their employees can best be handled and settled between the officers and employees of each particular railroad company or system. It will be a bright and happy day for our country when we get back to a condition of affairs so that the officials in charge of a railroad can run that railroad and the workmen on that road are permitted to settle their own grievances without being subjected to the interference and dictation of a Government tribunal and 'one big union' officials, no matter whether such officials claim to represent the interest of employer or employee.

"I say that it is impossible for the Railroad Labor Board to determine what shall be the wages and the working conditions on all the railroads in our country without doing an injustice either to one side or the other, and frequently to both. Railroads are operated as a private institution, and they should remain as far as possible a private enterprise, under the proper Government regulation, for the protection of the public.

"The very existence of the Labor Board has been a standing invitation to the railway operators and employees to submit every kind of minor grievance to the board for its consideration."

Mr. Cooper has introduced a bill in Congress to abolish the Railroad Labor Board and re-establish the Board of Mediation, Conciliation and Arbitration formerly provided for in the Newland's Act.

### Judge Williams Agrees

Immediately following Mr. Cooper was Judge Nathan B. Williams, associate general counsel of the National Association of Manufacturers. On a number of points Judge Williams is in substantial agreement with the speaker who preceded him. He, too, spoke of the dangers of trying to do too much by recourse to law, by trying too hard to legislate improvement instead of bringing it about by discharging our individual civic duties more effectively. There is altogether too much restriction by government, too much alleged reform; schemes that have been tried and found wanting, sometimes thousands of years ago, are

being seriously advanced today. More and more work is being thrust upon the government and, as a consequence, government is becoming too centralized, too powerful, too disposed to encroach upon private rights. The encroachments of the national government upon the rights of the several states is encouraged too much, tolerated too much.

There is much sham to legislation, as portrayed to us through the press. We have "an anarchy of laws;" that is, many enactments that contradict or nullify one another, get on the books and have the effect of robbing law of its force. Even lawyers can no longer wade with any degree of confidence through the labyrinths of new enactments. During the time that the present Congress has been in session some 13,000 bills have been introduced into the House and some 3,000 in the Senate. The favorite sport of the average member of Congress is introducing bills. Often bills that have been proposed with great acclaim are found to be almost verbal repetitions of other bills that have been laws for years. Congress is not entirely to blame. The people want an active congressman, and the congressmen hold their jobs by displaying much activity.

There should be more intelligent action by the citizens individually and as associations. When legislation must be had, let it, if possible, be through the states. Strengthen local authority a little more and there will be more efficiency. Over centralization of government means gross inefficiency.

### More Power for States

The states should handle many matters now controlled by Washington. They should, for example, have greater power in fixing rates. (The Interstate Commerce Commission has done much good work but is swamped and is continually getting in deeper. When a matter not of prime importance goes to the Commission, it must necessarily be assigned to a subordinate, possibly a sub-subordinate, whose work is reviewed by the subordinate. The reviewing process is carried on through a number of stages of increasing importance and finally the document reaches a man in authority for signature. He does just that, and fixes his signature.

Local law making bodies should be given greater power, says Judge Wi



liams. Only by bringing this authority closer home can we make it more effective and more responsive to public need.

After Judge Williams had concluded his address, President Dann invited open discussion along any lines that the members chose to follow. The invitation was accepted by a number of producers and there were some interesting talks on a variety of subjects.

Mr. Greenfield of Atlanta suggested that the Association consider the advisability of holding the annual convention in Washington each year, stating that this would make it easier to secure good speakers and to get in closer touch with the government departments that had quite a lot to do with the industry. Immediately proponents of other plans appeared. One gentleman found a goodly following when he stated that conventions should be held in such cities as appeared likely to attract the largest attendances. Mr. McDermott of Knoxville advanced an idea that was a variant of the last proposed. He added the thought that the convention city be a different one each year, so as to get the different groups of producers interested each year.

### New Uses for Gravel

The discussion of new uses to which sand and gravel may be put came up next. A Pittsburgh producer told how he discovered that druggists in his city were selling packages of clean washed sand as grit for canaries at the rate of 10 cents a pound, or, expressed in terms to which we are more accustomed, \$200 per ton. He immediately made arrangements with a number of druggists to take "bird grit" furnished by him at a considerably lower figure that still shows him a big profit. The demand, of course, is not large.

Mr. Smith of Memphis drew attention to the apparent dependence of the Interstate Commerce Commission and other rate bodies on statistical information taken from the American Railway Association and other interested groups. Their figures have often been found wrong. For example, Mr. Smith's plant was set down as receiving 100 per cent car service over a period in which not a single car was delivered to his plant. The method of arriving at this service figure is interesting to say the least. Mr. Smith had been told that it would be use-

less for him to order cars over a certain specified length of time. He accordingly closed down a number of plants during this time. And yet, because he got all the cars he asked for, none at all, he was listed as receiving 100 per cent car service.

Mr. Shiely of St. Paul stated that he believed the bringing of the Association's office to Washington was one of the best moves that had been made. Much useful work was done through this office and Mr. Barrows was to be highly complimented on the efficient way in which he handled the car supply and rate matters recently undertaken. Mr. Shiely is another believer in the holding of annual conventions in various places.

Mr. Carroll of Buffalo started a talk along the lines of reducing gravel into sand. Mr. Dann told of his experiences in this work. He has been experimenting for some time and has tried out a number of different methods—disc crushers, high speed gyratories, dry pans and rolls. In his judgment the dry pans showed up best, with the rolls second. He stated that the T. L. Herbert Company of Nashville is doing some good work in this direction.

### Ready-Mixed Mortar

Then came a rather extended talk on the sale of a ready mixed lime mortar, produced at the plant and taken, almost ready for use, to the job. Such a plan would, it was said, prove popular with contractors on small jobs, since it would relieve them of a lot of work and insure a well prepared material. In this discussion a large number of producers participated. The plants of the Blue Diamond Materials Company at Los Angeles, Atlanta and Boston were referred to considerably and their success in the operation of such a plan commented upon at length. The effect of weather conditions on the success of the mixed mortar plan in certain sections, and limitations of the lime mortars in making plasters, as distinguished from gypsum plasters, were given consideration.

A reference to the sale of materials on a measurement basis made it very clear that the sense of the meeting was for sale on the basis of weight. A short amount of time was devoted to talk on advertising. A constructive suggestion which this brought was that all the printed matter of producers should carry a statement somewhat on the order of "we are members of the

National Sand and Gravel Association, which advocates the use of screened and washed materials."

The only speaker on Friday morning was E. W. James, assistant to Thomas H. MacDonald, chief of the Bureau of Public Roads. It had been Mr. MacDonald's intention to address the meeting, but sickness prevented his appearance. Mr. James gave some interesting statistical information of the Federal Aid road construction program. He told of how money paid for gravel has absorbed 25 per cent of the total appropriation to date and accounts for 40.4 per cent of the mileage. Water bound macadam was used for 2.6 per cent of the mileage, bituminous macadam for 3.5 per cent and bituminous concrete for 3.5 per cent. Total grading costs came to 23 per cent of the total amount spent, surfacing costs to 58 per cent, structural costs 15 per cent and miscellaneous costs to 4 per cent.

One of the most difficult works of the Bureau has been to establish specifications and to stick to them in actual practice. In 1916 only two states had specifications at all similar, all the others were rare birds. There were important differences as to sizes, standards, and methods of testing. Specifications were carelessly prepared and in many cases were merely the result of clipping parts of specifications at various other points. The results of this last practice were, in some cases, grotesque. The Bureau set about to correct this, established standard specification forms, and got 41 out of 48 states to adopt these forms.

### Much About Road Building

A bit of information that the gravel men were glad to hear was that the Bureau will no longer accept non-rigid bases less than 8 inches in thickness. Heretofore some such bases have not run over 4 inches in thickness.

After giving some more interesting statistical information on the magnitude of the road building program, Mr. James talked on the financing of the program and the matter of absorption by the public of bond issues. The government will have to study the matter of financing he said. It constitutes a big problem.

Upon the conclusion of his speech Mr. James answered such questions as were put to him. He explained that testing methods for stone and gravel were different because crushed stone,

being angular, shows a poorer wearing quality than it actually has as compared with gravel, which is smooth and not so much inclined to break and crack at the corners. No really reliable method of testing gravels has as yet been developed. One difficulty is that gravel contains all kinds of stone in a given mass, while crushed stone is a homogeneous material, the same throughout. In answer to another question Mr. James said that, in general, wear test results are in the same ratio as compression test results.

It was asked of Mr. James to define the powers of the Bureau of Roads in insisting that a known better material, or a material coming up to specification and procurable at lower prices than others, be used on a given job. He stated that by law the Bureau has only the right to veto the use of a material proposed by a highway department with which it is cooperating. The Bureau always insists, other things being equal, on the lowest bid if all materials proposed in the various bids are acceptable.

After the producers had asked and had been given answers to a number of questions of less general interest, Mr. James gave the floor to W. L. Smith of Memphis, Chairman of the Committee on Nomination.

Mr. Smith named as the four members of the Board of Directors who with the officers, would form the Executive Committee:

Hugh Haddow, Jr., Menantico, S. & G. Co., Millville, N. J.

G. C. Ross, Ohio River Gravel Co., Parkersburg, W. Va.

W. L. Smith, Memphis Stone & Gravel Co., Memphis, Tenn.

R. C. Fletcher, Flint Crushed Gravel Co., Des Moines, Iowa.

Mr. Haddow, Chairman of the Budget Committee, announced a 1923 budget of \$24,000. Of this \$15,000 is for the conduct of the Washington office, \$1,000 for publicity, \$2,000 for promotional activity, \$2,000 for traveling, \$1,000 for transportation, \$3,000 for executive traveling expense.

At the conclusion of this report, Mr. Dann, upon the acceptance of a motion, declared the convention adjourned.

The Genesee Sand and Gravel Co., Buffalo, N. Y., has increased its capital from \$100,000 to \$150,000



## Gravity Helps at This Plant

At Red Mill, Pa., is located the silica sand washing and crushing plant of the Ebensburg Sand and Stone Company. This plant is working a material which, while not of sufficiently high silicious content to make a good glass sand, is adaptable to many of the other purposes to which silica sand is put.

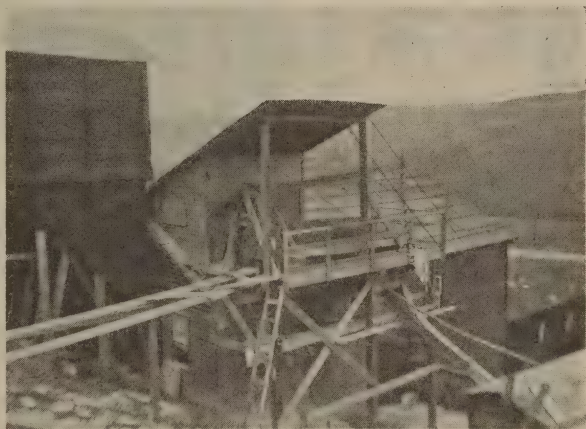
As shown in one of the accompanying illustrations, the stone from which the sand is secured is mostly quite thinly stratified. It is economically blasted, being shattered in the process to a fine degree of fragmentation, which makes the hand loading that is in vogue a comparatively easy matter. Lengths of track from the working faces to the tipples are very short and have a slight incline away from the faces to the tipples.

When the loaded cars of stone come to the end of the quarry track, as shown in the sketch and in one of the photographs, they are dropped forward on a rocking tippie. This tippie is arranged to dump under the weight of the loaded cars, its operation is controlled by a lever. The stone falls from this point through a chute into a rock bin, the highest point in the plant.

The sketch furnished with this article shows how gravity is utilized to do as much as possible of the con-

veying of material from the rock bin to the railroad cars. The plant is in this as in other respects, ideally arranged and very economical to operate.

There are at the plant three units each of the kind shown in the accom-



Aggregate screening plant operated by company.

panying sketch. One of the economies of the operating method is in the fact that it requires only 4 or 5 men to handle it successfully. One man is kept busy with each of the crushing and washing units, and one man at the loading belt which pours the drawn sand into cars, this one belt serving the three units of machinery.

The stone as it drops by gravity from the rock bin is fed into a 20x12 inch standard Blake type crusher, built by the Lewiston Foundry & Ma-

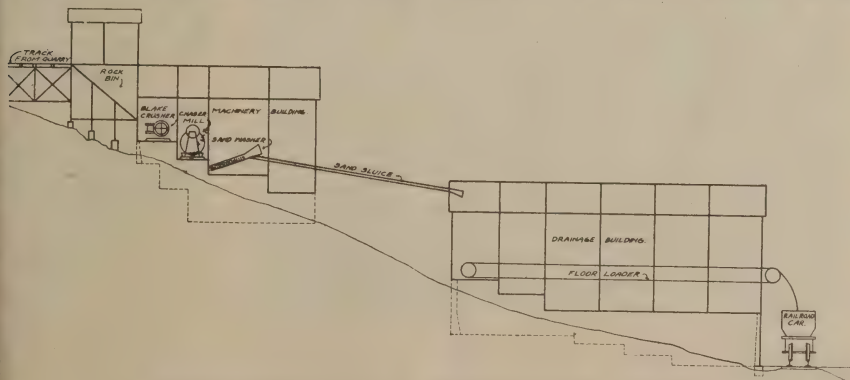


Diagram showing flow of materials through the plant.

chine Company of Lewiston, Pa., who also furnish the grinding, washing and conveying machinery and designed the complete plant.

The product of the jaw crushers drops, again by gravity, to 9 foot dry pans or chaser mills, one dry pan for each jaw crusher. These dry pans consist essentially of circular steel pans 9 feet in diameter in which revolve two heavy steel rolls mounted on a common horizontal axle. The pan itself is stationary. Water is fed into it and the material, as it is crushed by the action of the rolls, passes out through screens at the sides of the pan. The 9 foot pan will handle from 100 to 250 tons of material in 10 hours depending upon the hardness of the sandstone. The central shaft revolves at about 30 to 33 revolutions per minute. A revolving screen arranged to make a fine separation takes up the work after the dry pans, passing back to the dry pans any rejected material.

The material passed by the screens goes onto three batteries of Lewistown washers or sand washing screws, which operate by forcing the sand upward against a downward current of water. By the time the screws have worked the sand up to the tops of the troughs in which they run, the material has been thoroughly cleaned and drops from the end of the trough in fit condition for sale as far as washing is concerned.

From the sand washers the material is run down sluices into a drying building, where the moisture accumulated in the process is to a large degree removed.

Underneath the drainage building is a belt conveyor which, as shown in the sketch, runs from the back of the building as far out as the loading track, and fills cars by running into them a continuous stream of the plant's product.

In connection with the washing, grinding and crushing of silica rock, the company also have installed, under the supervision of the superintendent,

Mr. Long, a screening arrangement for sizing crushed limestone. The limestone is easily secured at the quarry where the silica rock is loaded. It is crushed at the crushing level and elevated to the screen on the outside



Part of the face, showing stratification of rock.

of the building shown in one of the photographs. From there the selected sizes drop down to bins which are served by a shipping belt, also shown in one of the pictures.

A new cement plant to cost \$1,500,000, with a capacity of 2,000 barrels a day it is reported, will be erected in the spring by the Linwood Stone & Cement Co., of Davenport, Iowa. The capitalization of this corporation has been raised from \$300,000 to \$2,000,000 for this purpose. This concern has been in business for several years, producing crushed rock, agricultural limestone, etc. A. E. Horst is president of the company, A. E. Carroll, vice-president; Otto Hill, treasurer, and J. F. Schroeder, secretary and general manager.

The Brewer Company of Worcester Mass., has operations under way for opening up the largest lime plant producing high-grade chemical lime in the eastern section of the United States, at Winooski, Vermont. The company owns about 50 acres of land in this locality, which is both underlaid and overlaid with vast deposits of high-grade limestone. The erection of an elevator and storage bins with a capacity of from six to ten carloads, is planned in the near future.





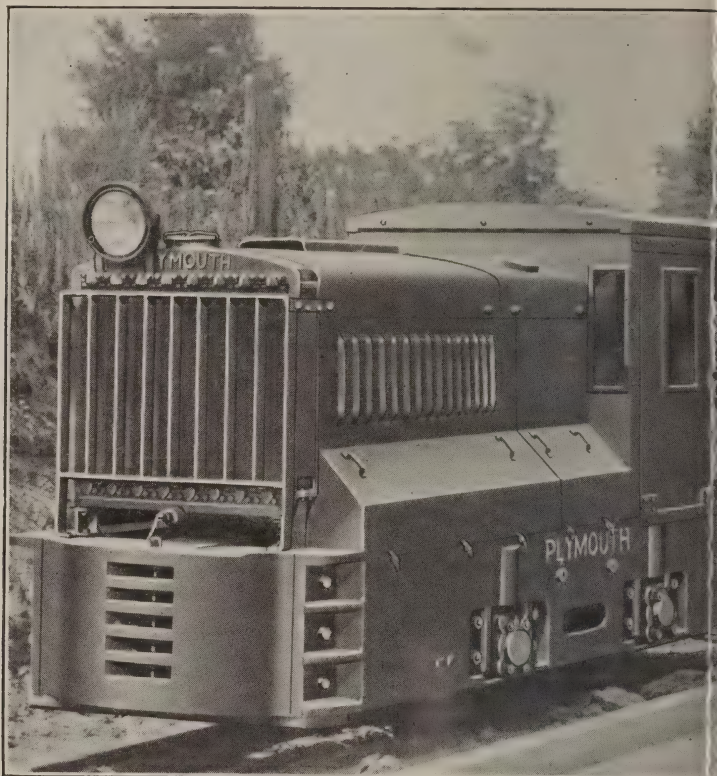
Shipping Belt for Delivering Concrete Aggregate



Red Mill Plant of Ebensburgh Glass Sand Co., from Pennsylvania R.R. Tracks



Weight of Loaded Car Causes Rocking Tippie to Operate



*One of the Three PLYMOUTH 7-Ton Gear Drive*

## The Power That Earns Money

Read Mr. Gladheart's letter in the adjoining column. Wouldn't you say that's the power that earns money?

Then write us for bulletin that fully illustrates and describes this super-powered locomotive.

THE FATE-ROOT-HEATH CO.,                      Plymouth, Ohio

**PLYM**  
*Gasoline*





*Carpenter Construction Co., Terre Haute, Ind.*

### *Mr. Gladheart's Letter*

Putnamville, Indiana, December 4, 1922.

mouth, Ohio.

the Fate-Root-Heath Company,

Gentlemen: Our third seven-ton Plymouth Gear Drive Locomotive has been received and all are giving the best of satisfaction.

We find that we can pull from three to six more cars with them than any other or seven ton locomotive. We have, as you know, eleven locomotives working. Your machines also have the best brakes and sanders that we have found.

Very truly yours,

HARRY B. GLADHEART, General Foreman.  
Carpenter Construction Company.

**PLYMOUTH**  
*Locomotives*



Plant of Krippendorf-Tuttle White Cliffs Products Co.



## Produces Whiting and Fertilizer

Notable in the development of the quarrying and reduction industry in the Southwest is the extensive plant of the Krippendorf-Tuttle White Cliffs Products Company, located in Little River county, Arkansas, in the extreme southwest corner of that state, and bounded on the south by Little River, one of the most beautiful streams west of the Mississippi.

The village of White Cliffs is so named on account of the enormous bluffs of chalk, a material which became known to the early settlers of Arkansas on account of its beauty and the ease with which the soft, snow white stone could be worked up into mantels, interior finish and other products. For many miles around the pioneers visited the scene of these deposits, early in the nineteenth century, to obtain their requirements of chimney and ornamental stone.

There are 2,600 acres in the tract owned by the Krippendorf-Tuttle Company, and 900 acres of this is said to be the extent of the cliffs proper. For a distance of nearly two miles up Little River the cliffs rise, at places, to the height of 135 feet, being sheer ascents, glistening white in the afternoon sun. The enormous volume of these deposits is such as to thrill the observer with the possibilities of this huge amount of valuable raw material.

Earlier development of these quarries and the establishment of reduction works was not thought of prior to a score of years ago on account of the remoteness of the property from shipping. The river was not a navigable stream and railroad facilities were distant and meager. True, there was an effort more than twenty years ago to manufacture cement according to the European methods, but it was unprofitable and generally unsatisfactory.

The crudity of this process compared with the modern American system rendered reduction unsatisfactory to the investors. There also was limited railroad shipping. Today there is a vast change. The Graysonia, Nashville and Ashdown is a short-line railroad serving White Cliffs and connecting with the Kansas City Southern at Ashdown, also with the Frisco-Rock Island lines, while to the north connection is made with the Missouri Pacific. Connections also may be

made at Texarkana with the Cotton Belt and Texas and Pacific railroads. From this centrality and the numerous radiating trunk lines a vast volume of business can be handled from White Cliffs.

Geologists declare the White Cliffs deposits to be of a superior quality, being 93 per cent lime. The chalk, when reduced, is therefore clear of grit or crystal. When run through the powerful grinders furnished by the Grunleder Pater Crusher & Pulverizer Company, St. Louis, the whiting is found to be from 95 to 100 per cent 200-mesh fineness. The weight of this finished product is but 55 pounds per cubic foot, while that of the raw material is 85 pounds.

The Krippendorf-Tuttle White Cliffs Products Company now is turning out whiting, asphalt filler and agricultural lime, each of which is in great demand, and orders for which are dependent on speed for filling only by the available supply of cars. The Proximity of great rock asphalt beds and the demand for asphalt paving is found to create an immediate call for asphalt filler from this plant.

Historic evidences of the geological period are numerous in the White Cliffs and bear a startling proof of the enormity of the volcanic disturbances in ages perhaps antedating humanity. By breaking fragments of the chalk stone in the quarry there are frequently and easily found mussel, clam and other shells, particularly the large sea conchs embedded therein. Some of these shells are perfect, the glazed inner surfaces being as true as if freshly gathered from the beach although they are loosened from the chalk 75 or more feet in the quarry depth. There also are found pine cones, petrified, embedded in the chalk at great depths. These have, through the processes of geology, been transformed into heavy, lead-like nuggets of "fools' gold." In some cases the shells found are the perfect bi-valves, never separated. When broken open these bi-valves are noticed to contain a chalky white substance. Other foreign matter which once evidently was on the earth's surface is occasionally discovered.

Whiting is a chalk ground so fine that its grains can hardly be detected. It is used as a pigment in the making

of paints, for the manufacture of linoleum, rubber articles, glazed china-ware, paper, cosmetics, fabrics, etc. The chalk cliffs of Dover, England, have hitherto supplied most of the lime used for these purposes in the United States. During the year 1919 there was imported from England forty-three million dollars' worth of this material. It has always been believed that there were no deposits in America that would yield products of as high a quality as those from the Dover cliffs. Before acquiring the property in Arkansas, the Krippendorf-Tuttle Company submitted samples of the powdered limestone from White Cliffs to various manufacturers of rubber goods, toilet preparations, and linoleum, for examination. As a result of the tests by these companies and of analysis by several geologists, the lime deposits of White Cliffs have been conceded to be capable of yielding products fully as pure as those from the English limestone.

Through the courtesy of H. W. Seymour, general superintendent of the White Cliff works, a representative of PIT AND QUARRY was enabled to inspect the properties and note the extent of their operations, together with enlargements now in course of construction. Mr. Seymour, who was for a number of years millwright for the Missouri Pacific railroad, with headquarters at Coffeyville, Kansas, has been in his present position since December 21, 1921. For the past year he has devoted his efforts assiduously to the reconstruction and enlargement of the plant. To state that it is satisfactorily approaching the condition its owners expect is a fact evinced by the trend of daily events at the works.

The quarries are being handled by P. H. Van Lear, for twenty years quarrymaster for the Little Rock Crushed Stone Company, with quarries at Big Rock, on the Arkansas river, opposite Little Rock, Ark. Mr. Van Lear extended the courtesy of an interesting visit of observation in his department.

There is a wonderfully picturesque feature presented to the visitor in these white cliffs of chalk deposits, their presence being emphasized by the river bottom environment from which they rise. Alighting from the mixed train upon which the traveler may go to the place, it is a distance of but one-quarter mile along the spur tracks to the mill. This is built on

the ledge of the original quarry of score of years ago, and consists of a group of large corrugated iron buildings and their tributaries, sawmill machine and blacksmith shops, mill supplies, store room, and offices for engineer and laboratory.

Quarries have been opened at several places during the past quarter of a century, and first class material obtained, the overburden being but scant. Mr. Van Lear now is engaged in the temporary or opening-up stage for the new quarry and is clearing away for a face. He is using type D-24 Ingersoll-Rand air drills. Blasts are made sufficiently strong to crop off such ledges as are immediately needed and without danger to the buildings. A No. 18 Osgood steam shovel handles the overburden in clearing to surface rock. Quarrymen with hammers break the boulders into smaller pieces, after which these are loaded into 1½-yard tram cars, and by gravity run down the tracks into the preliminary breaker. This is a No. 6 Williams mill. From the Williams breaker the chalk is carried by a Webster 18-inch rubber conveyor belt to the raw material storage bins.

At the present time there is but one unit of this storage. It has a capacity of 5,000 tons, and is substantially built on a ledge of the first quarry operated at White Cliffs. The building is of corrugated iron construction and contains twenty-seven heavily timbered cribs, each 16 feet square and averaging 25 feet in height. Two other units of similar size soon will be constructed alongside of this one. The total storage capacity of raw chalk then will be 15,000 tons. These units have an inside measurement of 60x105 feet each.

Further on this raw material is carried by rubber conveyor belts, 18 inches in width, to the reduction plant proper, and there ground in a battery of three four-roller mills to the fineness named in the early part of this article. At the present time there is a 10-ton rotary drier, but one of 30 tons capacity will be added in the near future, bringing the capacity of the mill up to 36 tons hourly.

The boiler room contains a battery of Geary type of Heine boilers, while in the engine room there is a 350-horsepower Allis-Chalmers engine. There is a 150-horsepower direct-connected generator and a 150-horsepower air compressor. The plant is





equipped with electric lighting and there is a good waterworks system.

Included in the plant are two Bates valve-bag machines with a capacity of 40 tons per hour. The quality of the product which goes into the bags is the pride of the company.

A finished product storage is under process of construction adjoining the reduction mill. It covers an area of 180x105 feet, erected as other buildings, on a ledge of the original quarry, and partial construction reveals a structure of ponderous strength. The capacity will be 2,000 tons of material. There will be two lines of storage units within this building, each being 20x120 feet and 30 feet in height. The compartment cribbing is of 12x12 inch hardwood timber.

Maintenance of the plant is insured by a well-equipped machine and blacksmith shop and mill supply store adjoining the works.

One of the valuable achievements of Superintendent Seymour is that of having ridden his horse over the 2,600-acre tract of supposedly cutover land, then requesting authority to purchase a sawmill. Officials of the company were inclined to receive the request as a joke, supposing there was no worth-while timber left. On being convinced otherwise a Fisher-Davis No. 2½ sawmill was purchased and

installed. During the long, dry summer teams and eight-wheeled wagons followed timbermen to the tall uncut, and to date 1,500,000 feet of the best of hardwood timber has been used in plant construction, while 250,000 feet of logs now are in the yards to engage the efforts of the mill men. These are of red gum, oak, ash and cypress, some of the logs being 5 and 6 feet in diameter. Cord wood to the amount of 1,400 cords is piled for fuel.

Only white labor is used at the Krippendorf-Tuttle White Cliffs Company plant and are worked ten hours daily at a good wage. Working and living conditions are excellent and there is a splendid esprit de corps evident, each individual taking the greatest interest and pride in the big mills.

That the company expects to operate this plant extensively and continuously is exemplified in the careful planning and provision of permanent improvements. Notable among these is the palatial office building and superior employees' living quarters. This is a two-and-a-half storied frame building, painted white, located at the apex of a cliff rising sheer 135 feet above the level of Little River, which flows at its base. It approximates in appearance and surroundings the noted "Cliff House," San Francisco harbor.



The building is quite lengthy and has a 12-foot porch the entire length to serve the second story, on which the offices and rooms are located. There are in the basement, or first floor, the mess hall, kitchen, bakery, store rooms, laundry, etc. The second floor contains a large general office with its fireproof vaults, the individual offices of the superintendent, civil engineer, and others. Opening on the long porch are eight bedrooms, each having a large, modernly equipped private bath; a breakfast room for visiting officials, a sun parlor, etc. The upper, or third story, in the roof, is devoted to a well appointed hall, 20x 60 feet, to be used for educational and social functions.

This administration building is reached by a flight of 250 steps with landings between each set of four individual flights. The entire length of these steps is almost 1,000 feet.

4821—PIT & Quarry 1-25 Campbell

Another important building project soon to be commenced by the company is the village, located on the tract. There are to be built thirty workmen's cottages, all of frame, five rooms and bath and sleeping porches. Electric lights and waterworks will be afforded. A company-community improvement will be a modern school house Mr. Krippendorf has promised the trustees of the school district.

There also will be built a commodious and attractive department store building.

All the while improvements and enlargements are in progress, finished products of several kinds are being turned out in large quantities and orders filled as fast as freight cars can be obtained. A good demand is had for the agricultural lime, as much of the upland is deficient in that chemical property, being sour and unyielding for the growth of legumes, corn and other crops. Ten years ago it was difficult for farmers to secure agricultural lime except at a very high cost, due to supply shortage and railroad rates. Of late years there is a special rate on agricultural lime and this soil sanitant now is within the means of both small and average farmers. During the fall months the trade on this product is best.

In the Krippendorf-Tuttle White Cliffs Company plant may be found a machinery equipment which emphasizes the rapid strides which have been made in this branch of reduction operations and affords a finished product which contributes to the excellence of other manufactures.

The plant was designed by the engineers of the Gruendler Patent Crusher & Pulverizer Company of St. Louis and the larger part of the equipment put in by this company.



## Slate Will Advertise

### Association Adopts Publicity Policy—Traffic Bureau Established.

The adoption of an advertising policy was perhaps the most far reaching move made by the National Slate Association during the slate industry meetings at New York, January 22 and 23.

The slate industry is among the oldest and most conservative of the country's industries and the unanimous acceptance of a cooperative advertising policy in the closing session of the convention marked the opening of a new epoch in the marketing of slate.

While there are a hundred main uses for slate, new uses are constantly springing up and it was because of the marketing ramifications of the industry that the National Slate Association was formed in June 1922.

The primary purpose of the Association is to establish a definite source and responsibility for slate information through a recognized organization and to stimulate the sale of slate products by bringing its properties and uses to the public consciousness.

Headquarters were opened last summer in the Drexel Building, Philadelphia, under Warner S. Hays, Secretary of the Association. Results were so immediate and of such value to the industry that the membership now representing about 80 per cent of all slate production in the United States came to the first annual convention full of enthusiasm and eager to broaden its field of activity.

The sessions of the convention were given over to a discussion of such subjects as "Production Problems and the Elimination of Waste," "Trade Co-operation," "Scope of 1923 Activities" and "Traffic Matters."

An increased assessment for advertising was made on the membership on the basis of sales of slate quarried or manufactured by each active member. Advertising plans were laid out and accepted. These embraced wide consumer and trade advertising.

Another marked step in advance was the establishment of a traffic bureau to supply full information as to shipping and routing. G. E. Brown of Belleville, Ill., was appointed traffic commissioner.

Appropriations for research work and special tests were made. The convention closed its sessions with the adoption of a code of ethics to standardize general practice within the industry.

The officers of the National Slate Association are: President, W. H. Keenan, Bangor, Pa.; Vice-president, G. F. Bernard, Boston, Mass.; Treasurer, A. H. Morrow, West Pawlet, Vt., and Secretary, W. S. Hays, Philadelphia.

Three new directors were added to represent districts formerly unrepresented in the association. These—C. A. Lowry of Auld & Conger Co., Cleveland, O.; C. H. Davis, Davis Slate and Manufacturing Co., Chicago, Ill.; P. C. Stanwood, Blue Ridge Slate Co., Esomont, Va.

The Albany Gravel Co., Albany, N. Y., has been incorporated with a capital of \$50,000. Incorporators: C. W. Maxwell, G. K. Smith, W. Green.

The Southeastern Gypsum Company, an Arizona organization, was recently incorporated at San Bernardino, California, with a capital stock of \$100,000.

A new stone crushing plant has been opened at Chester, Illinois, by the Columbia Quarry Company, which already is operating six quarries. This quarry is situated on the W. C. & W. railroad, which will insure good transportation.

The Hagerstown Lime & Chemical Company has recently been incorporated at Hagerstown, Maryland, with a capital stock of \$30,000. This firm will manufacture agricultural lime and chicken grits. Work has already been started on the plant, and machinery of the latest type will be installed as soon as possible. The incorporators are: J. S. Myers, W. R. Moler and Enos Kitzmiller.

The land board of the State of New York has been urged by a state official not to grant exclusive rights to certain sand and gravel interests to dredge sand and gravel from the Niagara river. The companies in question are under indictment in cases growing out of the Lockwood committee's probe into unlawful building combines.

# It Was a Good Convention

## Entire Industry Reviewed—Tonnage Basis of Dues Abolished—Schmidt for President

One of the high spots of the Chicago convention of the National Crushed Stone Association occurred at the very first session, Monday morning, when O. M. Graves of the General Crushed Stone Company, Easton, Pa., chairman of the resolutions committee, offered the amendments to the constitution which the committee had been working on over Sunday.

The radical change which the committee had determined upon was the abolition of the tonnage basis for the payment of dues and the substitution of a flat membership fee. The fact that this membership fee was so arranged that small individual producers might take out one membership, while the firm or corporation would be required to take out two, and might take out any additional number they desired, did not prevent the subject from being quite warmly debated, the chief reason for opposition being that it seemed very uncertain whether such a measure would bring in a sufficient amount of money to operate the association. A quietus was put on this, however, by an informal poll of the convention, which seemed to show that just the members present were disposed to take out sufficient memberships to furnish the major working capital of the organization. This being the case, those who desired to hold the matter for further consideration withdrew their motion, and the recommendation of the committee was adopted.

### No More Tonnage Dues

This provides for individual memberships of \$25.00 per year. This means that individuals doing business alone will be required to take out one membership, making their annual contribution to the association \$25.00, irrespective of their tonnage. Firms and corporations must take out two individual memberships of \$25.00, and may take out any number they desire above that. This will allow some of the larger companies to take out memberships for managers of their different plants and still not run the cost above what they have been averaging on a tonnage basis.

The provision which has been in

force up to this time allowing local or district associations to take out memberships was rescinded and all memberships of the national association will hereafter be by individuals.

The opposition to the tonnage basis of assessment was two-fold. One line of attack was that members did not like in this way to reveal their year's tonnage, and another was that this method of assessment was very unsatisfactory in soliciting new memberships, as with an uncertain tonnage as well as uncertain rate of assessment, the amount which the association would cost a prospective member was so indeterminate that few felt like entering into such an obligation. The associate membership fee was left at \$50.00 the same as before.

Other provisions of the constitution and by-laws were revised to conform with the new section regarding membership and dues, such as the elimination of the provision that the board of directors shall be elected by districts and substitution of a provision for the election of fifteen members by the annual convention.

The provision of the by-laws which states that the annual convention shall be held the second Tuesday in February having become a dead letter, it was discarded and the time and date of meeting left to the board of directors.

The secretary's financial statement presented to the convention at that session, while it showed that the association had practically enough money on hand at the beginning of the year to pay all its obligations, nevertheless demonstrated clearly that a comparatively few people had been carrying the financial burden, and it is believed that under the new arrangement the expenses will be more equitably distributed; while the fact that the dues will all become due and payable at the beginning of the year will allow the officers to pay their accounts more promptly and carry on the work of the association in a more businesslike manner.

### Sticking to Schedule

President Eames is to be congratulated on opening the very first session



comply on time, and adhering to this custom throughout the entire convention.

John Ericson, city engineer of Chicago, was the first speaker on the program, extending to the visiting delegates a welcome to the city, and suggesting in closing that he hoped they would not throw any of their material at the city while they were here.

President Eames in a brief opening address outlined some of the activities which the association might well take up during the session, including the revision of the constitution and modification of the basis of dues already referred to. He apparently came to the convention with the high determination to get the association onto a more correctly functioning basis and make it more of a power for the industry. He referred particularly to the matter of immigration and the serious shortage of common labor which our present immigration laws are producing, and he felt that something should be done in this matter, perhaps by the appointment of a committee to meet with a similar committee from the Road Builders' convention in session at the same time. He felt that the matter of transportation was a serious one, and that this matter should be adjusted in some way for the benefit of the entire commerce of the country, else government ownership and control might intervene, a thing which he felt would be disastrous, especially for our own industry where close personal touch with the railroads is so essential to smoothness of operation. He felt also that the rising tide of socialism in this country was a menace with which the organization should deal in some way.

W. C. Huntington of Wellborn & Huntington, business and engineering counsels, Chicago, read a paper on "Business Principles Applied to Quarry Development and Stone Crushing Operations." Mr. Huntington's firm makes a business of compiling reports of various industries for bankers and capitalists, so that he looks on a quarry primarily from an investment standpoint. He felt that quarry operators in general do not have sufficient facts at their command, not only regarding the quarry industry as a whole, but even regarding their own particular operations. He was very emphatic in saying that these facts must be known in order to make a business the greatest success, and that operators should

have a general survey of the industry, assembling by whatever means possible the experience of many other operators. He felt that most executives are tied down too closely to their own job, and cited the case of one producer who got very good returns from money invested in leaving his plant to the care of a capable superintendent and going out on a long trip to visit other operators in his particular line. He said that the attitude of producers toward each other has much to do with the merchantability of securities. In other words, that capitalists do not care to invest in fields where cut-throat competition is the rule.

### Krause on Transportation

E. J. Krause of the Columbia Quarry Company, St. Louis, was on the program to discuss the subject of the transportation situation. He was, however, too tied up with other matters to attend the convention this year, and a letter from him was read by the secretary. Mr. Krause said in his letter that it is up to all of us to take the "un" from uncertainty. He felt that we are too much dominated by the effect of our foreign relations on business. Ours is a domestic business, he said, and we should carry it on as such, realizing that there is a demand for building of all kinds in which our materials must be used. This being the case he felt that 1923 should make a record to be proud of. Transportation, he said, is the key to success now and in the future, and our greatest success lies in rushing production at the very beginning of the season, and making deliveries just as rapidly as possible while cars are available. He said:

"Salesmanship should be stressed and the work of the salesman kept ever ahead of the plant operation. Excess of production over selling capacity in the organization means ultimate loss not only to the individual company but to the industry.

"Coal is not in the center of the stage this year. There is a possibility that it may assume a dominating position through the fact that certain of the United Mine Workers officials are dominated by the desire to put over a program of nationalization. As you value the right of American initiative and property rights you should combat this tendency toward sovietism at every opportunity.

"Without a strike, coal costs cannot be reduced by the operators in the



The Annual Banquet of

union fields. A general strike is unlikely. A reduction of wages in non-union fields comparing with that which occurred in 1921 is not probable. The large losses sustained by the miner in the strike of 1922 followed by slack working time on account of lack of cars, have reduced his earnings until he will be easy prey to the agitator, and local or wild cat strikes may be expected. It is always safe to have a coal supply in possession of the consumer.

"Transportation is the key to your success in 1923 and the future. This plus our own vision and spirit of optimism and determination and our own hard work. While we are apt to think of transportation in terms of 'cars furnished' still the stone industry can afford to be actively for and cannot afford to oppose or delay any practical highway or waterway program.

"The railroad companies are going to be in position to furnish us equipment this season largely in proportion to the failure of general economic adjustments abroad. Our certainty of success lies in our utilizing the probable plentiful supply of equipment early in the season without committing ourselves to an unprofitable basis of market should shortage of equipment later in the season greatly restrict our operations."

P. C. Hodges of the Marble Cliff Quarries Company of Columbus, Ohio, also discussed the transportation problem to some extent, showing especially that the shortage of cars is very largely due to the division of available cars among too many mines. He showed that over a ten year period, while the production of coal increased only 3 per cent the number of mines increased 154 per cent. This means that a lot of small mines, and mines running on only a part-time basis, are demanding cars, and that naturally more cars are required to serve this large number than would be necessary if the coal industry were not the victim of such extensive over-organization.

### Know Your Materials

Mr. Waller Crow, of Waller Crow Inc., Chicago, engineers who are specializing in the mineral industries gave the opening talk of Monday afternoon. He urged producers to know the quality of their material and the purposes for which it is best suited. The glass industry for instance, he said, is just now wavering between the use of stone or burned lime, with the preponderance of opinion a little in favor of the limestone. A producer, he said, should know a fact of this kind, and understand wheather or not his stone met requirements for the glass industry. If so, he might be able to find a better market than for





on was well attended, as you can see

commercial use. Then again, he said, there are many stone deposits now going into commercial stone, which would make very satisfactory hydraulic cement. Regarding lime, he said that lime should be, and he believed ultimately would be, merely a by-product of a crushing plant, utilizing the stone which did not go into commercial uses. Stone, he said, has never received the consideration it deserves, and he made a strong plea for producers to know their material, and understand the market for which it would be best suited. He felt, however, that research must be largely along individual lines, as each plant is a problem of its own, not only regarding its raw material and equipment, but regarding its transportation, market and other governing features.

### Stone Man Now Banker

Mr. Crow was followed by J. E. Lindquist, vice-president of the Central Trust Company of Chicago. Mr. Lindquist said he was formerly in the stone business, and he knows it to be a fact that very few of the plants in the central west are now operated by the original owners. Looking at the business financially he said this would seem to indicate that the plants had not been properly managed, so that they probably did not produce an attractive income. He urged upon stone producers that they have available all

the facts regarding their plants, including history, markets, valuation, etc., this to be used in case they desire to make extensions and finance new work. He said prior to the era of the income tax he never found an operator who took into consideration the depletion of his deposit or depreciation of his plant. He feels that the income tax has at least been of value in bringing this to the attention of operators. He knows that the operator cannot sit back and wait for business, but must have lines of promotional work constantly under way to develop additional trade. He said that when he was in the business a number of years ago he wrote to Congressman Madden asking him to introduce a bill in congress for the federal aid of road construction, but the congressman felt that this was a revolutionary scheme, highly impractical and could not be put through; so that eventually some one else got the glory for originating the plan in congress. Mr. Lindquist remarked that the superintendent of a plant is more important than the sales manager, and cited one case where an owner in giving a bond issue was required by the bankers to make a contract with his superintendent for a period covering the life of the bonds. They felt that the success of the business depended to such an extent on the superintendent that he must be retained in order to protect them.

### Research Urged

Next followed the report of the research committee for the past year. This report was presented by the chairman, Harry Brandon of Piqua, Ohio. He was given the task at last year's convention of forming a committee, making an investigation, and submitting a report.

This report advised that the association take up research work to determine further uses for stone, better methods of preparing stone for present uses, and in fact, all problems of a general nature that can properly be made subject of an investigation.

The report specifically warns against the undertaking of work for the benefit of individual members as such, all activities to be of a general nature and designed to promote the use of stone in such a way as to be of advantage to the industry as a whole, and in this way, to result in good to the individual members.

The program outlined called for an expenditure of \$15,000 per year for two years with its continuation if results seemed to justify it and there still remained work to be done.

Some of the most important sections of the report are as follows:

We have a number of very excellent reasons to offer why this project should be undertaken in the manner suggested:

1. Our crushed stone industry is already late in arriving at the well-traveled road of research. We have therefore the excellent example of other industries which have previously seen this same possibility in their businesses. It is not necessary to go into detail regarding the wonderful results of the operation of the Portland Cement Association, Face Brick Manufacturers' Association, Paint and Varnish Association, and many others.

2. There are evidences of wasted energies, shown by accumulation of waste piles which, in their tremendous size, disfigure the appearances of most quarries.

It has cost an equal or greater amount per ton to place this material in these piles than the actual per ton cost of finished product.

The amount of money spent by the members of this Association in the past five or six years either in storing or in attempting reclamation of this waste material would have paid the cost many times over for this project.

In these times of high cost production it is becoming a serious menace to the crushed stone business to have to absorb the cost of producing these wastes.

Every existing hope of eliminating or utilizing these wastes must imperatively be investigated and if no hope presents itself we must invent relief, individually or collectively, before very long or some of us must close down production.

3. The modern trend of industry is toward the elimination of these wastes.

We do not want to be the last in the line of progress. We should have been pioneers in this wonderful work of waste elimination.

4. Industrial progress and civilization are frequently tied up with the result produced by the initiative of some alert individual producer. Many things that have registered their importance in the history of civilization have been brought about by some individual being sufficiently wide awake to find some method of disposal of over-production or waste products. Much of our great chemical industry is based on by-products or waste utilization. Glycerine was for long a waste from soap manufacture. Someone made nitroglycerine from it and now we clear our farms and run our quarries and mines with it or its related explosives.

5. The associations that have taken up these projects in the past have the satisfaction of becoming much more important factors in modern industry and are regarded with greater respect than would have been possible for any individual. The members of these associations have profited in direct ratio to the progress and initiative of their organizations along this line.

### What Can Be Expected by This Expenditure

1. Tabulate seasonal demands and educate users to rational demands with reference to distribution of unavoidable sizes in production. Provide for the distribution of crushed stone products with a minimum of conflict with the movement of other commodities in transportation.

2. Standardize consumption expectation by finding out the general connection between demand and production capacity, thus enabling both producer and consumer to figure with some certainty upon available production and market.

3. Tabulation of the uses of all crushed stone products based on the tonnage consumed.

A careful study should be made of these uses to see which ones can be extended. There would be very little justification in spending a large sum of money for research in a field which presents but little possibility of expansion.

4. Better information for the salesman regarding the value of his product, obtained through careful study of the results and statistics reported back to the company by the Research organization.

The value of the product is measured by its usefulness, and the cost of the production has little or no relation thereto.

5. Enlist services wherever possible of national, state and other agencies in every way that may assist both the producer and consumer of crushed stone products.

6. An exhaustive investigation of wasted over-production can be conducted so as to lay bare its facts in the hope of developing all possibilities of elimination.

After the preliminary ground has been covered and we are all thoroughly informed as to what is now known regarding the various crushed stone products, we must then consider and study them and delve into the unknown. In



the opinion of this committee, some of the possibilities of the near future are:

1. Development of new and varied uses of crushed stone products.

2. Keeping abreast with current affairs as they concern crushed stone operation, such as translation of technical reports; compilation of reports of various institutes and condensing the meat of them, as they concern common-sense business principles, and put them in non-technical language to be clear to everyone of us.

3. Assuring our entire membership of the latest developments as they occur in this and foreign countries, the same to be translated and condensed so that the non-technical man can secure all their advantages.

4. Through our Research organization we will establish recognition by the various bureaus at Washington which would be a most excellent introduction of a legislative and political affairs that affect our business. This introduction, coming in this substantial way, would insure more prompt response on many other questions such as railroad matters, priorities, legislation, immigration, etc.

Of the committee appointed to make his report, all members concurred in the views expressed except John J. Sloan of Chicago. Mr. Sloan was prepared, right after the paper was read, to give the reasons for his disagreement, but time did not permit just then and, for the sake of adhering to the program, the next number was announced.

The next speaker was Mr. John E. MacLeish of Chicago. Mr. MacLeish was assigned the subject of "Trade Association Activities." It is one that he can handle very well, for he acted as attorney for the Gypsum Industries Association, in the recent action in which it was charged with acting in restraint of trade.

### Legal Aspect of Associations

The best way to answer the question, "What may a trade association do?" may be answered, according to Mr. MacLeish, by asking another question, "What may competitors do?" or better still, "What may they not do?" To stay within the law, competitors may not agree to restrain trade unnecessarily, to the fixing of prices, the limiting of production, the division of territory, or to cause the establishment of prejudicial freight rates and other such restrictions. They may not combine or monopolize to the exclusion of their competitors. Outside of these practices, trade associations may do practically everything else to promote trade or bring about more production.

For some time past, the Department of Justice has been quietly investigating trade associations and the investigations conducted up to this time

have shown that many associations have a price reporting plan, a bureau for giving out production information, also freight and credit bureaus and departments for the development of the cost accounting plans for association members. The Department of Justice investigation also established that many associations have committees on ethics, or bodies to whom are assigned the work of establishing, as between member companies, relations that will redound to the benefit of the member companies, but to the prejudice of other firms in the same line of business and to the disadvantage of the public. The Department of Justice claims that in many cases the price reporting plan was used to fix prices, that the information on production was utilized to limit production, that freight bureaus were established to have prejudicial rates put into effect, and that they also serve the purpose of dividing up selling territories. The claim also was that credit bureaus serve much the same purpose in a slightly different way. Cost accounting bureaus were said to have arbitrarily established certain costs on which member companies computed selling prices.

Because, said Mr. MacLeish, a number of associations were known to the Department of Justice to be actually operating outside the law, the Department seems to have formed the conclusion that all associations have illegal purposes, and they consequently look with suspicion on the activities of all the associations. Mr. MacLeish warns that as long as this suspicion remains, the activities of all the associations will furnish subject matter for Department of Justice discussion.

This convention of the Crushed Stone Association should do a lot to remove this idea, since all discussion was open and the matters discussed, together with the manner in which they were discussed, were all inside the law.

### Gypsum Decision

Mr. MacLeish referred to the impossibility of convincing the Department of Justice that the Gypsum Industries Association was other than what they thought. In his own words, he "laid the cards on the table." Without, however, going into the matter from this angle, the Department of Justice went to the grand jury, which body refused to indict the Gypsum Industries Association. Eventually, the association was enjoined against the

continuation of certain practices, which, Mr. MacLeish said, did not make any difference, since the association was not carrying on those practices.

At any rate, the whole case established the right of associations to do certain things. These things, as included in the government decree, should not be understood as limiting the activities of associations. Associations may organize as corporations to promote the use of various materials by public research, may deal with engineering problems, etc. Second, associations may carry on educational work through schools, colleges, research and scientific bureaus, lectures, the use of the press, etc. Third, they may establish traffic bureaus to publish information issued by the carriers, and to deal with the Interstate Commerce Commission or State Commissions. Fourth, they may encourage the improvement of plant operation, and take steps to promote better housing, sanitation, insurance, etc. Fifth, they may establish credit bureaus and carry on all the legitimate activities of such a bureau.

These general features of the government decree give associations considerable liberty. It is very hard to get a case before the courts and have the limits of an association more strictly defined. One practice, of course, that is entirely prohibited, is that of price reporting. This price reporting, in the words of the Supreme Court, often "centers about a tacit understanding on an open price plan that is apparently harmless." Associations, said Mr. MacLeish, should pay more attention to the general character of the industry and thus discredit the idea that association activities are harmful to the public. That they are not harmful but useful to the public has been proved by the government decree, which really approved associations as necessary.

Following Mr. MacLeish on the program was Prof. James R. Withrow, of Ohio State University, a man who has done much to promote the use of agricultural limestone in Ohio. Professor Withrow's talk was on the value of research. He began by stating that research should not be a local matter, but should be conducted in a general way by industries as a whole. In the case of the crushed stone industry, research would accomplish good by emphasizing the importance of research

for the nation. Business operates on experience and research means fact finding or the accumulation of these experiences. The development of the aeroplane and the radio may be ascribed largely to research. Twenty years ago, men knew about the Hertzian waves and the effects produced when these waves were propagated. Research, though, made them worth something and developed the present day conveniences.

This, according to Professor Withrow, is the new "stone age," although it differs much from that other stone age in which savages used as weapons and utensils small amounts of the stone that we today utilize in such prodigious quantities. It was only with the coming of civilization that proper use was made of this necessary material. In the old stone age, a carload of stone would outfit a whole tribe while today the colossal extent to which we employ it is thousands of times greater. Stone serves a great variety of purposes, and the industry which furnishes this stone has the dignity of antiquity and of aiding human needs and human industry.

#### Enter Mr. Bowles

The Association was fortunate in having with it at its Convention Mr. Oliver Bowles, mineral technologist of the United States Bureau of Mines. The industry has long known Mr. Bowles through the published reports of his investigations, but this is the first time that any large number of them have had the pleasure of hearing him personally. Mr. Bowles presided at the Tuesday morning session, and opened the program with a paper in which he emphasized especially the engineering aspect of quarry investigations, and the necessity of maintaining an open mind regarding these problems and working them out along scientific lines irrespective of any preconceived notions. In other words he tried to get over to the convention the Bureau of Mines viewpoint in the investigations which it conducts. The only purpose it has in such investigations is to get at facts and apply them to the best interests of all concerned.

He gave as an instance of what they are doing, the recent investigation which have been made in the slate industry with reference to the disposal of a vast amount of waste which has accumulated at these plants, and the reduction of waste in the future. These investigations led up to the point of



recommendation of slate flour as especially useful as a filler in asphalt pavements. This, he said, might seem an unhappy illustration to introduce before a convention of stone men, inasmuch as either pulverized stone or cement had heretofore been recommended for this purpose, while now asphalt specifications have been modified to include slate. He brought this up, however, as an example of the sincerity of the Bureau of Mines in carrying on its investigations, and tried to impress upon the convention that the truth is not going to hurt anybody and that all will in the long run be benefited by the most adaptable and economical use of all materials. He said that in quarry investigations the main problems have not been solved in the laboratory but that the quarry itself must be the actual scene of experiments. He realized, however, that as we get down to finer points of scientific research, the laboratory proper will find its true place and will necessarily be used.

### Visited 600 Quarries

"During recent years I have visited about 600 stone quarries," said Mr. Bowles. "Many of them are highly efficient operations, but on the other hand I find some processes in use that are as crude as those employed in Egypt when the pyramids were built. The employment of inefficient methods is due partly to lack of capital, partly to tradition or to the influence of methods used in surrounding operations, and partly to unusual quarry conditions, but one great outstanding lack is the failure to apply the principles of engineering to the problems encountered. Some problems may require the experience and knowledge of a trained engineer, and he should be called in consultation. In many instances, however, the operator is quite capable of solving his own problems by applying to them two important engineering principles. The first principle is the ability to see both sides of a question, to weigh the evidence impartially, and to dismiss from consideration any preconceived opinion as to the most desirable solution of the problem. The second important principle is the establishment of conclusions on a sound basis of fact. Thus the preparation of positive data is a necessary function of any investigator, and this can be done only by keeping exact records of tonnage and costs. Few economic problems can be solved

without using figures, and no quarryman can hope to solve his problems without the aid of systematic records. Many processes now in use would be abandoned tomorrow if the operator had before him on a sheet of paper a set of figures indicating their excessive cost."

Mr. Bowles made a very favorable impression on the convention and his name on future program will undoubtedly be noted with great interest.

Victor J. Milkowski, engineer of the Morris Machine Works, Baldwinsville, N. Y., followed with a discussion of hydraulic stripping. This consisted of a running comment on a number of lantern slides which were shown, bringing out the point that hydraulic stripping can be used to good advantage when there is a large amount of material to be moved, a good foundation to work upon, plentiful supply of water, cheap power and adequate facilities for depositing the spoil.

This was followed by a paper by Mr. J. Barab of the Hercules Powder Company, Wilmington, Delaware, on drilling and blasting, which will be given separately.

### Immigration and Railroads

At this session, Mr. Graves, of the resolutions committee, presented an additional report covering several subjects. The most important of these was a resolution placing the convention on record as believing that the labor and railroad situations are the two most important problems not only before this particular industry, but affecting practically all industries, and in view of the fact that since the output for 1923 was largely curtailed by lack of labor, and while not advocating unrestricted immigration, urging upon the Government of the United States immediate action looking toward the modification of the present immigration laws. Also that the president of the Association appoint a committee on immigration and railroads and that a copy of the resolution be sent to the Road Congress then in session for their approval and co-operation. The committee also suggested sending telegrams to ex-presidents Krause and Rice, also telegrams to Secretary Herbert Hoover and J. C. Roth of the Interstate Commerce Commission, thanking them for courtesy extended to representatives of the association on the occasions of their various interviews with these officials. The committee also recommended that the

report of the committee on research, which was read on Monday, he adopted in principle and carried out to such extent and in such a way as the directors might approve and as might be possible with the funds on hand.

The appointment of an active, vigorous membership committee was also advised. These propositions of the resolution committee were all adopted unanimously by the convention.

The president later announced the following committees:

Immigration and Railroad Committee—B. D. Pierce, Jr., Chairman, W. W. Boxley, J. J. Sloan, J. D. Ohrt, E. J. Krause—P. C. Hodges, A. Acton Hall, W. L. Sporborg, Jas. Savage, F. T. Gucker, Clarence Blakeslee, W. G. Swart, O. M. Graves.

Membership Committee — O. M. Graves, Chairman, B. D. Pierce, Jr., N. L. Hely, J. J. Sloan, A. R. Wilson, Nathan C. Rockwood, E. S. Hanson, T. I. Weston, R. B. Tyler, W. W. Boxley, A. Acton Hall, Mr. Binns, O. C. Dodson, H. A. Major, Mr. Workman, Chas. A. Freiberg, Geo. H. Balfe, A. J. Blair, W. F. Wise.

A letter from a Kentucky producer asked the association to discuss the loading of dynamite without tongs, telling of how his insurance company insisted on this. Mr. Sloan said that "anyone who dropped 60 per cent dynamite into a hole 40 feet deep should have in his pocket a map to Heaven and a letter of introduction to St. Peter."

### 600,000 Tons a Year

Next came a paper by Alexander McKerman, superintendent of the New Haven Trap Rock Company, New Haven, Conn. In this paper Mr. McKerman gave a good general outline of practices at the workings under his management. He began by telling of the production of 600,000 tons of trap rock in the 9 producing months of last year, told of the light over-burden easily removed by revolving shovels and teams, and the drilling which is conducted both vertically and horizontally. Vertical well drills go down 40 feet of the 60 foot face, are 8 inches in diameter, 20 feet apart and 30 feet back from the face. Horizontal snake hole drills are 28 feet back and 7 feet apart and are put in at floor level. Vertical holes are double loaded, a charge at bottom and one near the top separated by tamping. Two detonators are used in both the horizontal and vertical hole firing, leaving little chance

of a misfire. Loading is by shovel into 6-yard dump cars, standard gauge. These bring the rock to a 48x72 jaw crusher with secondary reductions handled by gyratories.

A. C. Vicary, vice-president of the Erie Steam Shovel Company, showed a number of slides of various models of the Erie shovel. Mr. Vicary's desire to help speed up the program caused him to pass up discussion on the Erie Company's prize contest on steam shovel operating costs. The pictures, however, were very good and showed the range and durability of the machine in an effective way. A feature of this group of pictures was the view of the back-acting dipper, something new in this line.

### Blasting in a City

Otho M. Graves, assistant to the president of the General Crushed Stone Company at Easton, Pa., when called on to tell about "Blasting Experiences in the City," spoke of the difficulties that his company had at Winchester, Mass. in a quarry that they took over in 1919. At the time the quarry was purchased, they considered as one of the factors in arriving at a decision the proximity of a group of houses, the nearest about 2,000 feet from the quarry. Upon assuming control, they were immediately requested to pay a number of bills for damage to some of these houses, the damage ascribed to blasting operations at the quarry. Thinking that there would not be many such cases, they settled the first few at prices ranging from \$50 to \$300 per house. Immediately, claims began to come in from many property owners of the group of houses mentioned. The stone company, becoming convinced that the damages were not due to blasting, had installed in a considerable number of places in over two years' time, two portable seismographs, instruments for recording ground vibrations caused by earthquakes or other causes.

The experiments conducted over two years showed that the vibrations caused by blasting were not nearly of sufficient intensity to cause any damage to the houses. In fact, it was shown that a force no greater than one-hundredth of that required to damage the buildings was produced by the vibrations that resulted from the blasting. On the strength of this data, so carefully collected, the company began a policy of refusal to pay damages alleged to have been caused by



blasting operations. Immediately, an occupant of one of the houses started suit, introducing no testimony other than the general statements of persons in the neighborhood, who could advance opinions but no real evidence. The suit was begun in October, 1921, and it appears in the courts about once every week, continuing up to the present time. The result of this case will establish a valuable precedent.

### "Missouri Locomotives"

Norman L. Hely of the Edward Hely Stone Company of Cape Girardeau, Mo., spoke very interestingly on conveying methods employed at the Cape Girardeau quarry. For haulage power, they use "Missouri locomotives," in other words, mules. Mr. Hely drew attention to the fact that no set conveying system can be established at their quarry due to the lay of the land with respect to the plant and the quarry faces. Stressing the point that haulage is the most important factor of economical quarry operation, he showed by clear description and good stereopticon pictures, how the mules are utilized most efficiently. Six-yard cars are used, and the mules, in some cases, are worked in teams, an unusual thing around a quarry. It was necessary, for the sake of the mules, the harness, the cars, and the driver, to find the proper means of applying this mule power to the quarry cars. This was done by the designing of special harness which would keep the single and double trees from running into the mules and entangling them. This harness employs a solid metallic piece running back from the collar and held up by the breechings.

### Crusher Men Have Innings

C. G. Buchanan, president of the C. G. Buchanan Company of New York City, delivered a paper on "The Jaw Crusher as a Primary Breaker." Mr. Buchanan's paper constituted quite a complete treatise on the advantages of the jaw type machine. While necessarily technical throughout, Mr. Buchanan strove to make his argument as easy as possible for a non-technical man to understand. Among the arguments adduced to prove his contention, Mr. Buchanan claimed for the jaw crusher the slightest pressure on bearings and the greatest leverage, stating that rolls greatly strain the bearings and that gyratories impose a heavy burden on the eccentric. He stated,

too, that the value of the jaw crusher was enhanced by the fact that it has a wide range of adjustment, that the parts are in plain sight, that the regulation of the jaw swing is managed without difficulty, that the drive is more direct, that it is easier to take it apart and to compensate for the results of wear.

The afternoon deliberations began by the reading of a paper on "The Gyratory Crusher as a Primary Breaker." This paper was prepared by W. J. Roberts, president of the Traylor Engineering & Manufacturing Company of Allentown, Pa., and was read by Mr. Hayes of that company. The paper was technical to a considerable extent, and necessarily so, and made for the gyratory as good a case as Mr. Buchanan's paper made for the jaw crusher. The paper gave as reasons for the gyratory crusher's superiority the large opening which acts as a hopper, and keeps an amount of stone always ahead of the crushing surfaces, in the face of irregular production. It was stated that, utilizing the same opening as the jaw crusher, it was possible to put out three times the production. Ease of speed control was set down as another point for the gyratory, as were the curved crushing surfaces and the possibility of producing a smaller product. Crushing shock was claimed to be more evenly distributed by the gyratory, because of its continuous action as distinguished from the intermittent action of the jaw crusher. The claim that the jaw crusher was more accessible for repairs was disputed in Mr. Robert's paper, stating that the gyratory is just as accessible for repairs. More rapid development of the gyratory crusher was pointed out as proof of the possession of greater possibilities than the jaw crusher. The early type gyratories were rather light and did not stand up under abuse. Since then, they have been made heavier and otherwise greatly improved, this improvement extending also to the lubrication systems employed.

Brownell McGrew of the Allis-Chalmers Manufacturing Company was to have delivered a paper on "Roll Crushers as Primary Breakers." Mr. McGrew was unable to appear before the convention because of work that kept him busy elsewhere. However, he sent in his paper on the subject, but because it would take at least a half hour to read, was not brought before

the convention and will be published at a later date.

A talk that gave the A-B-C's of washing and separation of sizes by hydraulic methods was made by Edmund Shaw, a consulting engineer of Chicago. Mr. Shaw illustrated his talk by charts. He showed the character of top, rising, and hydraulic water currents, which last is a resultant of the actions of the top current of a current introduced at the bottom of a settling device. Early in his talk, Mr. Shaw gave the limits of good work in hydraulic sizing, showing how well rounded  $\frac{1}{4}$ -inch stones could be handled, while with angular stones  $\frac{1}{8}$ -inch would be about the average.

### Hydraulic Separation

Mr. Shaw explained how hydraulic separation theories take note of the grain weight rather than the grain dimensions and how it is possible, knowing the product required to be separated by hydraulic methods, to calculate the current velocities sufficient to get an effective separation of any particular finenesses; also, how knowing the current velocity and the specific gravity and general sizing of the material, it is possible to tell what finenesses can be secured.

Charts showed the use of each of the three currents referred to above, explaining how a top current running over a washing box will accomplish the same work, but not nearly so much, as will be accomplished by the use of a rising current set up by introducing the water into the box in such a way as to make it flow down in the center and up the sides and from there, over the edges. The top current is effective for heavy materials that do not require much washing; where there is considerable clay, the top current causes deposition of this material. He illustrated how small changes in size of round pebbles cause great changes in weight, and showed in which cases hydraulic separation is better than separation in screens. He emphasized, too, the fact that currents must be uniform, for streams of material are very sensitive to current speed changes. Mechanical devices must be provided to stabilize the current action.

Mr. Magrath of the Consumers Co. Chicago, prefaced his discussion of crushing and screening by a statement that little information on screens of various kinds is available. In view of the fact that requirements of archi-

tects are yearly making the matter of screening more and more important, Mr. Magrath devoted an amount of time to the general subject. Some of his findings in this investigation form in part the paper presented at this time.

He told of the Consumers Company's practice of using rotary screens on nothing below  $1\frac{1}{8}$  inch, this meaning the aperture and not size of the stone. He has found that the most convenient screening on sizes below  $1\frac{1}{8}$  inch is secured through the use of vibrating and shaker screens. Only by the use of these screens was the Consumers Company, he said, able to come up to the strict specifications under which they sell considerable material. An example of the strictness of these specifications may be gained from the Consumers Company's experience in having stone containing less than three per cent of minus  $\frac{1}{4}$  inch, turned down.

Taking up, one by one, the various features of the screen that aid this performance, he talked first of the diameter. This matter of diameter is governed considerably by the productions expected per hour. Larger diameter screens with more flattened convexes would be expected to thin out a product in going through the screens and thus help the screening process. Material, in going through the screen, assumes the form of a helix; that is, it travels in practically a helical path. Large particles help the matter of screening. The matter of feed is important, neither an overload or an underload being desirable.

Referring to the inclination of rotary screens, Mr. Magrath mentioned the general practice of inclining the horizontal axis at 7 degrees. Smaller screens would be inclined less, and longer screens more.

Other parts of Mr. Magrath's paper, referred to the efficiency of output. He stated that he has often, in practice, found it economical to use two screens instead of one, the second carrying only a light load and accomplishing a close separation. He spoke, also, of the percentage of openings in screen plates and the advantages in certain cases as between perforated metals and wire mesh. He laid down the axiom that the length of a screen varies inversely as the openings in a screen plate.

An important truth in screening that was touched upon was that the action



of a particle of stone going through the screen should be rolling rather than sliding. Stone should be carried up 45 degrees in the direction of rotation and rolled back, this giving more desirable results than a sliding mass.

### Storage and Shipping

Gordon Smith, of the J. C. Buckbee Company of Chicago, gave a very good talk on storage and shipping, illustrated with lantern slides. The paper was as non-technical as it is possible to make such a production. In it were given descriptions of various ground storage methods and costs on all of these methods. Mr. Smith gave as factors in the matter of deciding on ground storage, considerations as to, first, the amount of storage desirable, this based on average output and amount shipped, which constitute the experience of the plant. Along with this experience must also be figured its expectancy or chances of broader or varying markets in the future; second, the extent of the space available must be carefully considered; third, the cost of operation must be estimated as closely as possible, since the installation of the wrong method would prevent any lowering of production costs; fourth, the cost of installing the system must be thought of, and the figure representing the expected profits of the apparatus set opposite this installation cost; fifth, car supply, the weather during the times that it is expected to utilize ground storage, and many other items must be considered.

Mr. Smith, referring to limestone, said that the piles should be as deep as possible, and the weights and angles of repose well considered; 40 to 60 feet of height are considered economical in bridge type storage systems, 35 feet for trestle type systems. Above all, the installation should be simple, easy to operate, and should be easy to repair with unskilled quarry labor. Any system put in must be capable of easy enlargement, must be flexible in operation, and handle large and small amounts economically. The system installed must, in most cases, provide for the storage of various sizes, and this in such a way as not to mix the sizes and necessitate rescreening.

Taking up the various types of storage systems, Mr. Smith mentioned first the belt conveyor, equipped with shuttle, scraper or tripper, and operating with various belt sizes at various speeds. These belt conveyors are

mounted on trestles above and parallel to the piles. Sometimes the belt galleries are covered, sometimes open. The belt conveyor is a very economical system to operate.

Then there is the locomotive crane which, because of the low first cost, is often installed. Another point in its favor is that it is used for both stocking and reclaiming. It is also the best device to use to keep away from the tendency of stone in being piled to run the large sizes at the outside of the pile. The locomotive crane deposits sizes on the pile just as it picks them up. On the other hand, its operating cost is higher than the belt conveyor.

There is the aerial cableway, which necessitates a large installation cost, but it is comparatively inexpensive to maintain. This is used to a considerable extent in large stock piling operations. The gantry crane is also intended for big piles and carries with it a considerable installation cost.

A method of stock piling which Mr. Smith set down as very uneconomical is that entailing the use of small cars propelled along the trestles by man power and dumped at any point desired.

There is the stationary revolving crane equipped with two arms that build up a round stock pile. This device, because of the installation and operation costs, must deal with very large capacities.

The pivot bucket conveyor is another stocking-out device that operates on the general plan of the belt conveyor, except that the deposition of material is accomplished by tipping of the buckets at the proper places, instead of scraping materials from a belt.

The single line cableway is another stocking-out method employed in a number of places. Among these is the Buffalo Cement Company, whose installation was described and shown by lantern slides a little later in the program.

Mr. Smith was succeeded by Charles A. Freiberg, of the Buffalo Cement Company, who described his aerial cableway as capable of stocking out 40 or 50 tons per hour at small cost. This cableway is operated by two men, one loading and one at the tower. The system has been in use for about 25 years. It was once operated by steam, but has since been electrified, running from a 25 horsepower motor. It is very economical to maintain and requires nothing but labor, power and a small

amount yearly for keeping the bucket in shape. Labor cost is from 1 to 1½ cents per ton produced. Reclamation is by locomotive crane.

After these discussions on stocking out methods, A. L. Moscrip of the Consumers Company of Chicago asked if any of the membership had definite ideas on the exact time when a plant should be shut down, assuming that there was sufficient storage to carry through the winter.

Mr. Sporborg of the Rock Cut Stone Company of Syracuse, New York, also asked that discussion be started along these lines. Nothing very definite could be developed.

The matter of how to prepare ground for storage, how to keep stone sizes right in reclaiming, the feasibility of the dragline scraper, and a number of other points also furnished subject matter for discussion.

#### Mining Limestone

W. S. Snyder of the Templeton Limestone Company of Templeton, Pa., told of the limestone mining operation of his company. His remarks were supplemented by J. C. King of the Carbon Limestone Company of Youngstown, Ohio, who told of instances in Pennsylvania where the cost of mining limestone was said to be as cheap as the cost of quarrying. His statement differed considerably from that of John F. Schroeder of the Linwood Stone and Cement Company of Davenport, Iowa, who told of a man mining limestone at Moline, Ill. This man had told Mr. Schroeder that his costs were not anywhere nearly as low as those of the quarryman.

The next speaker was Geo. E. Deatherage, general manager of the Hoar Shovel Company of Duluth, Minn., who talked on a new shovel made by that company, which operates with only 7 feet of head room. It is a very small machine, intended for fast work and for installations where portability of the shovel is a valuable feature. His statement that it could be brought through a door 7 feet high made a big impression.

Thomas Robins, Jr., of the Robins Conveying Belt Company of New York City, spoke on the new power grizzly made and distributed by that company. This grizzly consists essentially of rolls with rings that are part of the roll and stand away from the roll proper. This machine was originally used in the coke field where it had the shape of a number of serrated discs.

These power grizzlies are installed in a number of limestone plants. Mr. Robins claims for his machine a power consumption of 1/7 the amount used for securing the same output through a rotary screen, power being utilized only to turn over machinery that is touching stone all the time. It has not the drawback of the bar grizzly which requires too much labor for cleaning. Capacity for a 5-roll grizzly installation was set at 1,000 tons per hour on a maximum power consumption of 25 horsepower. There are several models for the accomplishment of various separations.

#### Steel Belt Conveyor

The steel belt conveyor, which has been attracting an amount of attention lately, was explained to the convention by Harry Carlson, manager of Sandvik Steel, Inc., New York City. Thousands of these steel belts are installed in Europe and our American engineers are found very receptive to the ideas connected with their use. A steel belt is simple, it is cheap to install and operate, and presents to the abrasive action of the conveyed material a hard, smooth, dense surface. Idlers are placed far apart, or the belt may be used as a sliding affair, with or without skirt boards. Conveying may be done on both the upper and lower runs.

"Electric Storage Battery Locomotives" was the large topic assigned to C. W. Chappelle of the Ironton Engine Company, Ironton, Ohio, who handled it well. He told of the advantage of the storage battery machine over trolley and third rail systems which, in quarry operations, are unsatisfactory because of the exposure of trolleys and rails to dangers from blasting operations, and the greater work required for the shifting of tracks and power sources. The battery locomotive has not these limitations, and Mr. Chappelle said it is only a question of time when it will be generally accepted. The first cost is higher, but operation is cheaper. It has a great drawbar pull. It is operated from either of two types of batteries, the alkaline battery or the lead battery. Manufacturers' guarantees on locomotives and batteries make it easily possible to estimate costs of operation with accuracy. Five to seven year guarantees are usually issued on the Edison alkaline batteries, three to five years on the lead types. Charging is done overnight with apparatus that has been



made fool-proof and leaves no opportunity for overcharging. Storage battery locomotives are used largely in Germany and other European countries, under conditions paralleling or approximating those in the average stone quarry.

The Kennedy-Van Saun Manufacturing & Engineering Company of New York City was represented by W. T. Cavanagh, engineer, who told of this company's gearless crushers. On the small models used only as finishing machines, Mr. Cavanagh claimed operation on 25 per cent less horsepower. He presented a sketch of the machine. This crusher has vertical concaves, is high speed and, so Mr. Cavanagh claims, gives much less dust than the slower speed crushers. One large producer crushed 350,000 tons of silica rock without changing concaves. Among the larger machines that the company makes is a 66, the biggest size in the world, two of which have just been shipped to Japan. In general, Mr. Cavanagh claimed for his crusher a reduction of friction by the utilization of three instead of two bearings. Mr. Cavanagh then harked back to the discussion on storage earlier in the program, and told some of his own experiences. He stressed the importance of the influence of the crusher on storage, and gave an example of a company that was able to install an economical storage system by making revisions in its crushing plant.

### Magnetic Pulleys

The application and value of magnetic pulleys in crushing and grinding plants were set forth by Mr. Stearns of the Magnetic Manufacturing Company of Milwaukee, Wis. He began by the general statement that a magnetic separation device can be applied with advantage and economy to a crushing plant where the material to be crushed or ground contains what is commonly called "tramp iron." He spoke of the many chances that there are for "tramp iron" to fall into the stone. Broken drill points, chains, coupling pins, rail spikes, nails, iron straps, and tools are likely to be found in the stone. Magnetic separation absolutely removes the danger of this iron getting into the reduction machinery. Single accidents have frequently cost thousands of dollars and the comparatively small price of the magnetic separator is a good insurance investment. Mr. Stearns concluded his talk by reading a telegram from the Blue

Diamond Company of California, who stated that results secured from their magnetic pulley installation were far better than they had expected and that they considered it a valuable addition to their equipment.

### It Was a Good Banquet

On Tuesday evening, the Association members attended a banquet, held in the Grand Ball Room of the Hotel La Salle. The affair was very well conducted and was undoubtedly enjoyed by all present. The meal was very well prepared, the speakers were men of prominence, and the toastmaster discharged his office with finesse, appropriating as little as possible of the program to himself, and keeping the proceedings going all the time.

Fred C. Murphy of the Brownell Improvement Company, entertained the diners with a number of songs to which his splendid voice did credit. Mr. Murphy was accompanied by H. E. Hopkins who, with his other accomplishments, is a finished pianist. The performance drew down plenty of well deserved applause and brought a number of encores.

The toastmaster was John J. Sloan of the Wisconsin Granite Company of Chicago, Ill. He addressed the banqueters on "Our Industry," a topic that gave him an opportunity to deliver a highly colored speech. He very gracefully avoided this opportunity and made a short talk which, while eloquent, was simple. At the conclusion of his talk, he introduced the first speaker of the evening, W. H. Finley, president of the Chicago & Northwestern Railway.

### Railroad Presidents Talk

Mr. Finley's subject was "Transportation." He began by a comparison of our present highly developed methods of transportation with the primitive methods of times not so far back. The pioneers of this country, in their advance upon new sections, depended mostly upon the waterways that they encountered in their travels. Hence, in the early pioneering at least, settlements spread outward from rivers, which were the highways in those times. Various methods of land transport were in use, but depended entirely upon animals for power and were subject to a good many limitations that made transportation and travel matters not to be thought of lightly.

Then came the railroads, and with their advent the real growth of the

country began. They are directly responsible for the development of whole sections of this country, notably in the West, and have always been a means towards making these United States, in the true sense of the word, united.

Today the railroads have much to do with the prosperity of the country. But they also face many problems. These problems whole groups of people who know nothing about railroad-ing are ready to solve and, as Mr. Finley says, the hardest thing about the railroad business is this continuous interference with its affairs. The roads are, however, in good condition, and if left alone, will soon get in better condition. Much equipment is being replaced and repaired, and additions to the rolling stock and other facilities are being made by many roads. The car shortage bugaboo is not nearly so portentous as it was.

Although the mere addition of cars will not solve the question of shortages, additions are being made and equipment is being put in much better condition than it was a short time ago. Ideal railroad conditions call for not more than 5 per cent of the cars in bad order, and not more than 12 per cent of the engines. This ideal condition is being more closely approached in many places. The real cause of car shortage is the tangling up of cars on various lines, and the holding of cars too great a length of time for loading and unloading. The shippers can help the railroads considerably by giving early notice of their requirements and by quick loading.

Everything, Mr. Finley says, points to big business, and the railroads are preparing. They fear only a labor shortage. Labor is scarce now and, depending as it does to a large extent upon immigrants whose entry into the country has been limited, is becoming scarcer. Mr. Finley believes that, since Americans will not do the hard work of railroad-ing, the doors should be opened to all who can be assimilated and taught American ideals.

Mr. Finley concluded his talk with a short statement of his position in the matter of quarries operated by railroads. His experiences along these lines have been uniformly unsatisfactory. He says that a railroad is an operating and not a manufacturing organization. Railroad men have a training that is different from that of quarrymen, and do not make good quarrymen.

C. H. Markham, president of the Illinois Central Railroad, next told the quarrymen present of "The Public's Interest in the Railroads." He said that too many are using political pressure against the railroads. Political rings, anxious to take over the management of the transportation systems, are doing everything they can to discredit the roads, and the roads are forced in self-defense to do many things that they do not like to do, but which are essential for their preservation. Many railroad critics think that any good business man ought to be able to run a railroad, but Mr. Markham reminded us that a railroad is not like most other activities; it is a service, not a business.

Referring to the waterways, Mr. Markham stated that all that waterways could handle in the way of freight would not be a "drop in the bucket" to what railroads are handling now. He spoke of the 50,000,000 ton total export and import tonnage of the entire United States, and said that this tonnage is just about what one road, his own, carries. The total tonnage handled by the railroads of the United States last year was 1,000,340,000 tons. The Mississippi River, which parallels a large part of the road of the Illinois Central, on which operates the new government barge line from New Orleans, accounted for only 665,000 tons as against the Illinois Central's 50,000,000.

During 1922 the roads have bought more cars and engines than ever used before, this in spite of the imminence of the La Follette Valuation Act. Referring to this act and its expressed and implied claims that railroads are over capitalized, Mr. Markham alluded again to the case of the Illinois Central, which is capitalized at \$388,000,000, and operates a trackage of 10,000 miles. This would mean a cost per mile, including equipment and all, of \$38,800 a mile. The road has 75,000 freight cars and 18,000 locomotives which, very conservatively valued at only a part of their replacement cost, would be \$155,000,000, leaving \$238,000,000 of the capital for stations, repair shops, roundhouses, and the other many facilities of a modern railroad. This would mean that a mile of road be valued by the railroad at \$23,000, as against amounts of \$25,000 that are being paid for concrete road in Illinois. This, of course, would be the price for merely a single track road.



Mr. Markham's talk terminated with the assurance that the railroads were doing everything they could to help the shippers and, if left alone, would accomplish this purpose.

Next on the program came Dr. William K. Hatt, director of the advisory board of the Division of Engineering of the National Research Council. Dr. Hatt read a paper that contained a great deal of interesting data on the road building movement now on in this country. He brought up many comparative figures on the costs, convenience, and general desirability of highway and railroad transport, with the comparisons showing up considerably to the advantage of the highways. He went at length into the subject of the movement of vehicles on public highways, and recommended the adoption of a number of road regulations to facilitate movement.

### Eames Reviews Growth

W. Scott Eames, president of the National Crushed Stone Association, delivered a short, a very short, talk that was also very much to the point and consequently very good. In his talk, he referred to the growth and present standing of the industry, which may be ascribed largely to the activities of the association. Mr. Eames expressed his gratitude for the co-operation given him by the officers and membership and assured them that it had been a pleasure for him to control the destinies of the association during the last year.

S. L. Squire, official representative of the Canadian Good Roads Congress, extended "Hands Across the Border" in a talk, the sincerity of which may be gauged by Mr. Squire's very honest criticism of us for the penalties that we have in recent years put upon Canada in the way of tariff and exchange. In spite of this, Mr. Squire said, we have still many points of contact with Canada and should work with her in accomplishing our common destiny. He spoke of the great future Canada has before it, of its untold resources, and its active, intelligent population.

James H. MacDonald, treasurer of the American Road Builders Association, told of "The Good Roads Show," which this year was bigger than ever before. Mr. MacDonald, who has been called the "MacAdam of America," said that he thought it would be a long time before the sun set on the

last mile of macadam road. He paid his respects to the use of bituminous binding in macadam roads by saying that it was the worst thing that could have been done to discredit a good material; that the macadam road, because of its softness and yielding capacity, was in certain circumstances superior to the concrete road. Mr. MacDonald has been a pioneer in road building methods ever since, years ago, he began to interest himself in this important industry. He has always been associated closely with stone producers, knows their difficulties, and has always co-operated with them. He is, therefore, always more than welcome at any gathering of crushed stone producers, a sentiment that he said he felt towards the producers themselves.

An address by A. P. Sandles, expressing his appreciation to the officers and membership of the National Crushed Stone Association, completed the program.

Between the various numbers were given vocal and musical selections by the Chicago Glee Club. The selections were very well received if the applause they drew down can be taken as an indication.

### Cost Accounting

During the Wednesday morning session, A. J. Blair of the Lake Shore Stone Company of Milwaukee, Wis., a past president of the association, presided.

The first speaker at this session was George W. Hafner, expert cost accountant of Chicago, who talked on cost accounting principles and their application to the crushed stone industry. Mr. Hafner referred to the well known tendency of us all to stand out against progress, to malign progressive movements before they are successful, and to acclaim them after they are successful. Many business men suffer from this common tendency and do not follow in line with progressive movements such as, for example, the better keeping of costs which result in a better knowledge of the business. Facts and figures must be compiled accurately and understood carefully if a man is to know the reasons underlying things in his business. In the crushed stone business, Mr. Hafner said, the individual producer should know how the industry stands as a whole, and should then learn more about his own business to see that it is

keeping up with the march of progress. In other words, associations should establish standards, and individual firms should try to measure up to those standards. Mr. Hafner illustrated his talk with a number of charts which showed how the various facts of a business may be made more easily understood by the use of graphs.

The subject of cost accounting brought up general discussion on some items of cost around a quarry. O. M. Graves showed charted cost figures of his company, for limestone, quartzite, and trap rock operations. It was found that costs of various producers on some of the common quarry operations were two and three times as much as the costs of other producers.

Oliver Bowles spoke of the necessity of exact records on new work, and stated that, in his investigations for the Bureau of Mines, he found it very difficult to get anything but expressions of a very general character on important phases of quarry operation.

### Depletion Discussed

Next followed a general discussion on depletion. I. S. Tinker, of the Connecticut Quarries Company, stated that the government on their last income tax return, had allowed a depletion figure of  $\frac{1}{2}$  per cent per ton on all the trap rock they produced. Mr. W. L. Sporborg, of the Rock Cut Stone Company, Syracuse, New York, was told by government field operators that the  $\frac{1}{2}$  per cent depletion figure is an arbitrary figure effected by other considerations. Mr. Sporborg has found that the decisions of the field auditors is frequently overruled by Washington.

J. J. Sloan of the Wisconsin Gravel Company stated that in his operations field auditors, backed by Washington authorities, allowed 5 cents per ton on rhyolite, quartzite, diorite, and granites, and  $1\frac{1}{4}$  cents per ton on limestone. These figures were based upon the length of time the deposit is supposed to hold out. Mr. Sloan believes that if the facts about an operation are sufficiently known and properly set before the government, proper depletion figures will be allowed.

A. R. Wilson, of the Granite Rock Company of Watsonville, Cal., said that the Association should have an accounting department, and cited the case of the San Francisco Contractors Association, who recently established

engineering and cost accounting departments to whose findings all members have access.

George E. Schaefer of the Rochester quarry of the General Crushed Stone Company gave an interesting paper on "Merchandising Quarry Products." He stressed the fact that quotations should be given in writing or confirmed in writing; that there should be a 10-day acceptance clause to guard against changes in price or production; that the practice of immediately investigating winners of bids should be put into effect so that quotations to them could be made without loss of time. The terms of sale should be given clearly and completely, with all features of the contract properly covered. The giving of discounts helps. Although there must be some pliability in dealing with customers in the matter of taking up materials ordered, customers must be made to accept delivery on stone ordered. Freight prepayments should be discouraged. In general, the sales department should be governed by the operations of the quarry.

Harry H. Brandon, of the Ohio Marble Company of Piqua, Ohio, spoke of the need for better salesmanship and the greater need for better salesmanship in the crushed stone industry. Mr. Brandon in a very good paper stated that more salesmen fail because of a poor sales manager than for any other reason, and that a sale should in most cases be made before the salesman gets on the job. Dealers must be helped in the development of markets. To show how this is done, Mr. Brandon outlined a campaign conducted by his company in Western Ohio which was very successful.

The committee on resolutions offered a resolution that the board of directors consist hereafter of 19 members instead of 15 as heretofore, and the motion was carried.

### New Officers

The nominating committee placed before the association the following names:

President, F. W. Schmidt, Morris-town, N. J.

First vice-president, W. H. Hoagland, Columbus, Ohio.

Second vice-president, W. L. Sporborg, Syracuse, N. Y.

Directors: F. Scott Eames, John Rice, A. J. Blair, A. Acton Hall, J. J.



Sloan, B. C. Pierce, Jr., W. G. Swart, O. M. Graves, W. W. Boxley, N. L. Hely, A. R. Wilson, Allen Patterson, O. M. Doolittle, James Savage, H. E. Blair, R. W. Scherer, J. F. Schroeder, R. B. Tyler and Thomas McCroskey.

The above officers and directors were all elected unanimously.

### Reducing Accidents

At the general luncheon on Wednesday the speaker was Sidney J. Williams, chief engineer of the National Safety Council, who spoke on "Reducing the High Cost of Accidents." He said that accidents are costing industry a billion dollars annually, and called attention to the fact that in the quarry industry there are two men killed and 170 injured per thousand every year. This is practically the same percentage of accidents as prevailed in the steel industry a dozen years ago. Nevertheless the steel industry has by careful study of the accident question and a determination to decrease the number of accidents reduced the percentage to about one-fourth what it now is in the quarry industry. The result is that quarrymen are now paying on an average about twice the rate for indemnity insurance as applies to the manufacture of steel.

He said that steel manufacturers have not only studied safety devices and have applied them to all their processes, but they have also studied the human element in their plants and have taken every means to get across to their workmen, even those who do not understand the English language, the safety message. He said the place to begin in a safety campaign is at the top, and that the reason such success has been attained in the steel industry is because the orders have gone out from Mr. Gary, Mr. Schwab and other leaders that the percentage of accidents must be reduced.

The two industries are, of course, not parallel, the quarry business being in much smaller units, but the same process of accident elimination can be applied. The quarry owner must be fully convinced of the necessity of getting accidents to the lowest point, and then one man must be held responsible for keeping accident prevention rules in force, and making observations around the plant looking toward the further elimination of accidents. The appointment of such a

man, of course, will depend upon the size of the plant. Some large organizations will have a department which will look after this entirely. In the smaller type of plants the superintendent, or one responsible workman, will have this assigned to him along with his other duties. Mr. Williams pointed out that the rate applying to quarries need not necessarily be uniform in a given district, but that the history of a plant will very largely determine the rate, so that any producer, by running along for a period of years with a very low percentage of accidents, will be able to get a better rate than where less care is exercised.

### Special Uses and Merchandising

At the Wednesday afternoon session John J. Sloan of Chicago opened the program with a paper on special uses of crushed stone. This paper is given almost in full in another part of this issue.

He was followed by Mr. R. W. Scherer of the Western Lime & Cement Company, Milwaukee, who spoke on merchandising crushed stone products. Mr. Scherer devoted practically all of his time to what he calls crusher-sand, otherwise known as screenings, which term, however, he objects to as seeming to indicate merely the refuse after other more desirable parts of the stone had been removed. He asserted that crusher-sand is not inferior to natural sand, and that it must be given a good name, and offered to the building world as a product in every way creditable and worthy of confidence. He believes that salesmen should have a thorough knowledge of their material, should know the tests and screen analysis of the crusher-sand they are selling, and be able to satisfy architects and engineers regarding its technical qualities.

He was subjected to some criticism by reason of his statement that a crusher-sand containing 20 per cent of fines passing a 100 mesh sieve is the most satisfactory. This was objected to by some of those present, not only on technical grounds as not being borne out by some of the tests which have been run, but also for commercial reasons as not being able to meet highway specifications, at least in some of the states where a percentage of only 3 to 5 per cent of dust is allowed.

Prof. D. A. Abrams of Lewis Insti-

tute, Chicago, gave in a general way the results of some tests on stone screenings as a fine aggregate for concrete which had been made under his supervision, and as a result of which he felt able to assure the convention that by the proper proportioning of all the materials just as good a concrete could be made in this way as with natural sand. He said, however, that it would require perhaps 20 per cent more water.

Mr. Hull of the U. S. Bureau of Standards, Washington, D. C., gave some general data regarding fire tests which have been made by the Bureau on reinforced concrete columns, showing the advantages of crushed stone for this purpose over other materials.

Before the convention closed Nathan C. Rockwood, editor of Rock Products, was introduced by Mr. Graves and was given an enthusiastic vote of thanks for the work which he did as chairman of the program committee. In closing this report PIT AND QUARRY wishes also to add its testimony to the value of the program. It feels that this convention has been the most successful which the National Crushed Stone Association has held, and realizes that a large part of this success both in the preparation of a satisfactory program and in getting out a large attendance has been due to Mr. Rockwood's efforts backed by the hearty support of the officers of the association.

## Missouri Plant

We are showing herewith two cuts of the plant of the Highway Stone Company, Webb City, Missouri.

This plant is located one mile north of Webb City on land covered with the refuse from mining operations.



A Compact Plant

The material produced is known as lower sheet ground run being clean white and blue flint.

The new plant has a daily capacity of 500 tons of crushed stone and is on two railway lines.

Herr's quarries, Mountville, Pa., are maintaining active operations with a good working force. The company is said to have orders on hand for material to insure production for some time to come.



Vast Deposits of Material at Webb City



## Agstone Association

### Convention Was a Major Activity of a Busy Week

Officially, the National Agstone Association met in annual meeting in Chicago on Thursday of convention week and held its election. Semi-officially it held a delightful banquet on the previous evening. And unofficially it met at luncheon on two days of the convention of the National Crushed Stone Association. So the producers of agricultural limestone had plenty of opportunity to discuss their problems—and they did so to the fullest extent.

At the business meeting, E. M. Lamkin, the indefatigable, was re-elected president, for the good of the industry and to the satisfaction of all concerned. Other positions on the roster also remained about the same, except that W. H. Margraf took the place of W. H. Hoagland as treasurer and on the board of directors, H. E. Bair took the place of W. M. Brown on the board, and the name of Harry Filer, Sr., of Grove City, Pa., was added to that body.

The Ohio group in the association pledged themselves to support an agstone fellowship at Ohio State University for a period of five years at a maximum expense of \$2,000 per year.

Five new members were taken into the organization at this meeting.

The banquet on Wednesday evening was one of the most enjoyable events of the week. Good fellowship, oratory, agstone discussion, and the story telling lasted almost up to midnight.

A worth while contribution to the deliberations of the Crushed Stone Convention was made at the luncheon of the agricultural limestone producers at noon on Monday. At this meeting Edgar M. Lamkin, president of the National Agricultural Limestone Association, presided. During the progress of the meal there was considerable informal discussion among producers on many features of agstone production and marketing.

While these discussions between individual members were not held down to any particular program, they resulted in the exchange of much valuable information. For example, a producer from Salt Lake City sat be-

tween a quarry man from Missouri and a university professor, and many views were passed to and fro, which will, undoubtedly, influence a number of operations.

### Lamkin Reviews Agstone

The first approach to anything like adherence to formal program was the talk given by President Lamkin, in which he reviewed the advances that have been made in promoting the sale of agricultural stone, and gave an idea of the field that the agstone producer has to work. He spoke of the matter of sizes, told how the finely divided product, while its cost makes it harder to sell, goes far to gain general acceptance for the use of agstone by farmers everywhere. He said that the most common means of discrediting the use of agstone is employed by producers when they sell coarse material and screenings for application on land. He drew attention, also, to the common mistake made by many producers of selling their product too cheaply, thus giving rise to the belief in the minds of farmers that agricultural limestone bought at such low cost is of little value.

In general, for the benefit of those who have not experimented much with this material, Mr. Lamkin touched upon the many features of production, the kind of stone that is most valuable, and the sizes which, when the stone is applied, are productive of the greatest effectiveness.

At the conclusion of Mr. Lamkin's talk, an interesting round table discussion was opened by Clyde Calvin of the Bessemer Limestone Company, Youngstown, Ohio. Mr. Calvin indicated briefly the kind of stone that his company is using and the means that it commonly employs to get the fine reduction necessary. A number of producers joined in with comments that were illuminating. Particularly so was the talk given by J. C. King, of the Carbon Limestone Company, Youngstown, Ohio, who has made quite a close study of agricultural limestone, and gave details of its value for certain crops, and the amounts that various growing plants take up. He told of how alfalfas take up 100 pounds of calcium to the ton, how soy beans and other leguminous crops use about 40 pounds to the ton, all of which depletes the ground just so much and makes it necessary to replace losses by some such means as the application of pulverized limestone.

### Discussion of Sizes

Attention was directed during the discussion to the fact that the reason why the coarser sizes of agstone are, when applied, costly and relatively ineffective may be ascribed to the fact that a particle of limestone applied to soil neutralizes the soil for only a short distance from the stone and that, once this little neutralized zone has been completed, the effectiveness of the agstone ceases. This shows that the finely divided material is more readily available and gives quicker results.

R. S. Newman of the Lawrence Publishing Company of Cleveland, publishers of farm papers, gave some very interesting information, more from the farmer's point of view, but very useful just the same. Mr. Newman brought with him a number of maps and gave out some figures which showed the producers the present and potential markets for limestone. The first of these maps showed the way that the crushed stone industry is distributed, or, to be more exact, condensed in the United States. Another map showing the production of leguminous crops in those parts of the country in which there is a heavy limestone production, indicated the very important present and actual markets that the producer of agstone has before him. The speaker also told of potential markets afforded by certain sections of the country, notably the West, where the production of limestone is comparatively small, but where the acreage of leguminous crops is very large. He showed how, in the course of time, these western and southern sections that are not now using much lime, will require it, and advised producers who can turn out a marketable stone to lay their plans for the future as well as the present. His talk dovetailed well with a number of statements made by Mr. Lamkin in which the latter spoke of the present and future necessity for more lime in American soils. Mr. Lamkin referred to production of certain crops in Germany and England that go as high as 34 and 38 bushels to the acre respectively, while Ohio can produce only 14 bushels of the same crops to the acre. This discrepancy is largely due, as shown by Mr. Lamkin, to insufficient lime. Even China, whose impoverished fields are kept alive only as a result of great labor, has a production of 21 bushels to the acre of these crops.

### There Are Alkalis and Alkalies

After this talk, the discussion started again, and a number of questions were asked and answered. One of these questions, propounded by Mr. Major of Salt Lake City, may give a number of producers some things to think about. He asked how limestone, which is alkaline in character, could be applied to fields in his projected market which are themselves alkaline in character. This question was answered by drawing attention to the fact that the materials which make the western fields alkaline are themselves true alkalis, based upon sodium, potassium, etc., while limestone is a member of the alkaline earth family and is just as effective in correcting true high alkalinity as it is in correcting too high a degree of acidity.

Valuable information on soil acidity was brought out by a discussion between the last speaker and Mr. King, in which the former touched upon the nature of the acids present in soil, showing how the term "humic acid" must be understood as merely grouping quite a number of complex acids produced by plant decay, etc.

After this began a discussion on chicken grits. Harry Brandon of Piqua, Ohio, threw considerable light on this subject, although he began his remarks by modestly disclaiming any knowledge at all of the subject. He spoke of the work that is done by his company in furnishing three sizes which are, roughly,  $\frac{1}{8}$ ,  $\frac{1}{16}$ , and a scant  $\frac{1}{4}$  inch, and told of the experimental work conducted by the company, in which they fed various grit combinations to flocks of chickens and carefully tabulated the results as to egg production, character of shell and condition of the fowls themselves. He stated that his company at one time did a very large business in chicken grits, furnishing the material to poultry feed concerns who mixed it in with the feed. As time went on, the business that these companies furnished became greater and greater, but it appears that they were abusing what should have been a benefit to poultry raisers. In other words, they were putting into their feeds too much grit and too little actual poultry feed, the grit content in many cases running as high as 50 per cent of the feed. State investigations did away with this abuse in many cases by setting down the amount of grit that could legally be mixed with feeds. In some states, this grit content



s set at 2 per cent, in others 3 or 4 per cent, but never in any case approaching the amounts used before legal notice of the abuse was taken. Thus, a market perished over night. At the present time, however, the company is selling more chicken grit than it did before, but is now putting out the product as such, in which condition it is usually sold the feed people. It is put up in 100 pound bags which average about \$1.00, giving an income of \$20.00 a ton on this material.

Chicken grit should contain a liberal proportion of calcium, which was formerly supplied by oyster shells commonly mixed with stones of small calcium content.

On the second day of the convention, arrangements had been made for a luncheon in territorial groups, but the sections as arranged for the first day proved so successful that the agstone and machinery sections were continued as before.

### No Longer a By-Product

J. C. King of Youngstown, Ohio, presided over the agstone group, and started the program by telling one of his favorite stories in his most acceptable manner. Following this, he said that agstone is no longer in the infant class as byproduct, but that the time has arrived for producers to make it a profit-showing part of their business. He says that his company is selling agstone in bags at \$5 a ton, regarding which one of his fellow producers at the convention told him that "Jesse James had nothing on him." As a matter of fact, he said that he is showing a profit of 22½ cents at this, as it is carefully prepared stone, 70 per cent of which passes 100 mesh.

Mr. King then introduced W. A. Ostrander of Purdue University, who gave some very helpful suggestions on co-operation between the colleges and the producers of agricultural limestone. He says that Indiana should have fifteen million tons of limestone spread over its farm lands just as soon as possible, and while the college men are going out to sell the farmer on the idea, the producers should follow them right up with salesmen to take their orders for limestone. He said that in cases where this has been done, it has shown remarkable results in the way of sales. He is confident that the problem in agricultural limestone is not one of price or size of material, but that it is just to get the farmer

interested in using this material. He said he is not pleading with producers to make a low price, because a farmer can well afford to use limestone at the price at which it is now being sold; but what he wants more than anything else is to get the producer and farmer together and get them to doing business with each other. "We have talked limestone," said Mr. Ostrander, "in terms of limestone rather than in terms of what the farmer gets out of it. We should help the farmer to visualize the results which limestone will produce rather than simply talking about the material itself." He is very much in favor of lime bins at important centers in order to equalize distribution and provide against car shortage at the busy season of the year. "Every car of limestone," he said, "is worth twelve hundred dollars to the farmer."

Mr. Ostrander was followed by Professor Bauer of the University of Illinois, who gave a technical talk on the action of limestone on soil.

The Acme Cement Corporation, Catskill, N. Y., has arranged for an increase in capital from \$1,350,000 to \$2,800,000, a portion of the proceeds to be used for general expansion. Operations are being maintained on a good production basis, with employment of regular working force.

The Huron Portland Cement Co., Ford Buiding, Detroit, Mich., has arranged for the immediate rebuilding of its local storage and distributing plant at Atwater and Riopelle Streets, destroyed by fire, November 15, with loss of about \$250,000, including building, stock and equipment. The new structure will cost about \$100,000. The company's mill at Alpena, Mich., is operating full and heavy shipments are leaving the plant; it is expected to continue on the present basis for an indefinite period. J. W. Boardman is vice-president.

A new company to be known as the Ohio Portland Cement Co., has been organized under Delaware laws with capital of \$3,000,000, to operate a cement mill in Ohio, the exact location of which is temporarily withheld. The company is represented by the Corporation Service Co., Equitable Building, Wilmington, Del.



The Quarry is a Family Affair

## New California Plant

### Producing White Limestone for Ornamental Concrete and Poultry Grits

The California Rock Products Company recently established a plant about twenty miles west of Los Angeles in Little Tejunga Canyon. The first unit of the plant will handle only white limestone rock, and is completed and the machinery installed. Regarding the plant the president of the company, Mr. Walter H. Packard, writes:

"The machinery includes a Dodge crusher with a capacity of 100 tons in 24 hours, a pair of Allis-Chalmers rolls (10x16inches), elevators, graders, etc., and four bins with a capacity of 50 tons.

"We are also building an addition to our main plant, 20x40 feet for storage.

"In this first unit we will grind only the white crystalized limestone to be used in Terrazzo, roofing and fines for coloring stucco, plaster moulds, etc., and our main product of limestone grit for chickens and other birds. This

dolomite rock which we grind for chickens and birds will be in three sizes, for turkeys and geese; chickens; the baby chicks and caged birds. The small size will be put up in 2-pound cartons and shipped all over the United States.

"This product contains 66.8 per cent calcium carbonate which takes the place of the lime in clam and oyster shell now being used, and also contains magnesia and phosphate enough for a tonic; 75 per cent of this limestone is soluble and the balance, of silica acts as a grinder in place of granite grit now on the market. This product has been thoroughly tried out among large poultry raisers and orders from them will keep our first plant running to capacity.



The Plant



## Hoosiers Show Optimisim

### Indiana Sand and Gravel Producers Plan for Successful Year

The eighth annual convention of the Indiana Sand and Gravel Producers' Association, which was held in Indianapolis January 10 and 11, was an optimistic convention in every sense of the word. Optimism concerning the next year was expressed from the short address of M. A. Neville, president, who opened the convention, until the last remarks had been made at the close. The expression of speakers and those producers attending was that while the past year had been good, the next would be better yet.

At the beginning of the convention, President Neville made but a short talk, in which he outlined the work that had been done during the past year. Mr. Neville has been ill for some time and a fuller report was left to the secretary, R. C. Yeoman.

In his report Mr. Yeoman declared the volume of building and road construction, cash on hand by the public at large and the improved financial status of the farmer, all were contributing factors to his belief the industry would have a good business in 1923. He said the output of the members last year showed a material increase over the year previous. He gave the results of the rate cases which followed the last convention. In speaking of the withdrawal of the Indiana association from the National organization, he said the spirit of co-operation between the two had not been lampened in any way. His report showed three special meetings during the past year and several district meetings. He told of the profitable trip to the Wabash valley plants by H. F. Clemmer, engineer of tests for the Illinois State Highway Commission. During the year several concrete contractors made use of the facilities of the organization for securing proper advice on work.

A test of sand for agricultural purposes was made during the year in combination with humus for corn growing. The test was made on a Marion county farm in competition with fertil-

izers and lime. A road roller test for packing gravel roads was tried, but with indifferent success.

Because of the time and money required the experimental work with a screen for testing gravel by the wet method was cut short, but Mr. Yeoman hopes to continue this work this year. The laboratory work last year was much the same as the year previous. Experiments with tar and asphalt binders for gravel proved successful, according to the report for light traffic.

In his recommendations for work this year, he asked that a freight rate and car supply policy be outlined and something definite adopted on which to base activities. An advertising and educational campaign was urged. He advocated promoting better relations with the Illinois Highway Commission. Other recommendations were:

Design an exhibit to show the value of clean and screened sand and gravel.

The installation of a contractor's estimating service, where plans and specifications might be collected and quantities figured.

A new map of Indiana showing the location of plants.

Close co-operation with the American Society for Testing Materials, the American Concrete Institute, the Purdue road school, the state associations of county surveyors, road superintendents and county commissioners.

The compilation of a freight rate book.

The recommendations were referred to the executive committee with power to act and the advice given that action be taken as quickly as possible.

Because of the substantial condition of the treasury, it was voted to reduce assessments during the coming year by 50 per cent.

The nominating committee was composed of G. V. Miller, H. E. Neal, John Kuert and Abe Hart. Resolutions were in charge of a committee composed of E. Guy Sutton, D. R. Snyder and A. M. Brown.

At the luncheon which followed the first morning session the association had as guests Judge Lairy and Mr. Barnard and Mr. Gates, of the firm of attorneys which represents the organization, in the matter of car supply. Following the luncheon the convention reconvened and listened to a full discussion of the subject "Car Dis-

tribution by Law" by Mr. Barnard, setting forth the rights and privileges of the producers and the authority invested by congress in the Interstate commerce commission with reference to declaring emergencies and issuing priority orders. According to Mr. Barnard producers have several rights in the matter of car distribution which have not been judiciously exercised.

A lengthy round table discussion, concerning ways and means of securing these rights and privileges, in which the other two members of the firm entered, followed and resulted in a motion by which the secretary was instructed to secure from the attorneys the character of information to be collected and forms to be used by each producer in conduct of 1923 business so that the members will be fully prepared to act effectively and positively against the first recurrence of discrimination in car supply.

G. J. Nattkemper, of Terre Haute, was unable to be present and the address he was to give was eliminated, the time being spent in discussing the car situation.

The nominating committee made the following report:

For president, J. A. Shearer, Indianapolis, president; vice president, L. R. Witty, Terre Haute, secretary-treasurer, A. M. Brown, Indianapolis. Directors, J. P. Coyle, Chicago, E. S. Baker, Noblesville and Abe Hart Sanborn of districts No. 1, 2 and 4 respectively.

The day following Mr. Shearer tendered his resignation as president, stating that owing to business conditions it would be absolutely impossible for him to devote as much time as would be required, and A. M. Brown was unanimously elected as president and his resignation as secretary-treasurer was accepted. Mr. Shearer was elected to the office of secretary-treasurer.

Numerous speakers on trade topics marked the second day's session. H. Colin Campbell, advertising manager of the Portland Cement Association, Chicago, spoke on "Advertising Raw Products."

"Our association follows the indirect method of advertising," he said. "Its purpose is to arouse interest of the public in finished products rather than in raw materials. By creating a desire for a finished product, sales of raw materials become automatic.

"Cement and gravel men have one great asset it is service. Let it be known that quality underlies your product. That would be a good opening gun in an advertising campaign. There is no industry that can not afford to advertise. It is not an expense, if rightly done, but is the wisdom of investments. An advertisement of sand and gravel in the building page of a newspaper is not only effectively placed, but less space is required for the attention of the builder concentrates on that page."

S. C. Haddon, secretary of Allied Motors Commerce, spoke on "Needed Legislation for Financing the Indiana Highway Program." He said that more than \$6,000,000 Federal-aid money is being held in Washington for Indiana roads but the state is not getting it for the reason that it does not raise the money to match the Federal aid available. "Indiana is falling behind in Federal aid at the rate of \$750,000 a year and no prospect of catching up," he declared. "The only way to catch up is to raise more money for road building in this state and the most practical way for raising the money is to increase the automobile license fee and place a tax on gasoline. The Allied Motor Service has two bills ready to offer the legislature on these suggested remedies. If they are passed he said more than \$10,000,000 additional will be given the highway commission."

At the noon luncheon, talks were given by Senator Eastman of Sanborn; A. H. Hinkle and W. J. Titus, of the Indiana Highway Commission; F. L. Catt, president of the County Engineers' Association of Indiana; Clyde Piper, president of the County Highway Superintendents' Association of Indiana, and W. M. G. Holland, of the Portland Cement Association. All dwelt on the things needed to secure better and more roads for Indiana.

The luncheon carried the meeting until late in the afternoon and the scheduled afternoon program was dispensed with. A short business session was held and the convention adjourned.

The Rockaway Sand & Gravel Co., of Inwood, N. Y., has been incorporated with a capital of \$20,000. Incorporators: F. D. Licurse, A. S. Schurachio and F. Lavelle. Attorney, T. J. McGuire, Cedarhurst.



## Indiana Stone Meeting.

Was Held in Chicago During  
National Convention

The Indiana Crushed Stone Association held a very enthusiastic meeting January 16th at the La Salle Hotel, Chicago, all members of the association being present.

Considerable time was spent discussing activities of the association for the coming year, after which there was the annual election of officers as follows:

President, C. E. Greely, Secretary and Treasurer Greely Stone Co., St. Paul, Ind.

Vice-President, B. L. McNulty, General Manager Lehigh Lime Co., Chicago, Ill.

Treasurer, V. G. Pogue, President Spencer Stone Company, Indianapolis, Ind.

Secretary, Fred W. Connell, Indianapolis, Ind.

Executive Committee:—*Chairman*, E. B. Taylor, Manager Mid-West Crushed Stone Quarries Co., Greencastle, Ind.; L. H. Hawblitz, Assistant to Vice-President, The France Stone Co., Toledo, Ohio; V. G. Pogue, President Spencer Stone Company, Indianapolis, Ind.; J. E. Baney, Manager, Newton County Stone Co., Kentland, Ind.; Geo. H. Balfie, Manager, Monon Crushed Stone Co., Monon, Ind.

Fred W. Connell was re-elected executive secretary, serving his ninth year in this capacity.

## First Aid in Wisconsin Quarries

Arrangements are being made by the Wisconsin Industrial Commission whereby the U. S. Bureau of Mines will give first aid instructions to men employed by the quarry and gravel pit operators. The meetings will be held during February and March. The following cities are centers for the quarrying industry and will be favored with the meetings: Racine, Milwaukee, Mayville, Menasha, Fond du lac, Green Bay, Janesville, Ablemans, and Wausau. The exact dates of the meetings are to be announced later as the car is laid up for repairs in Chicago.

The Orders on Safety in Quarries of the Industrial Commission provide that each quarry shall have two men competent to render first aid to an injured person. Eleven meetings were held last winter and 208 quarrymen received first aid certificates. Some of these men were able to render valuable services to those who were seriously injured in the quarries and

gravel pits during the last summer. Quarries are as a rule located several miles from the nearest doctor and accidents often result in serious injuries.

The course of training consists of demonstrations in which the men themselves assist. The work is divided up as follows:

1. The proper methods of stopping arterial bleeding from cuts and wounds;

2. The proper and approved methods of applying bandages to various parts of the body;

3. The splinting of fractures;

4. Artificial respiration;

5. Proper transportation and care of injured during transportation.

## Enter Manganese and Chrome Steel Field

The recent announcement of the Inland Engineering Company of Chicago concerning their entry into the manganese and chrome steel casting business, mentions a number of men whose names have been prominent in the manganese steel industry for many years.

Walter S. McKee, formerly vice-president and director of the American Manganese Steel Company, is president and treasurer of the new organization. His experience in the manganese steel business covers a period of 18 years.

Edward S. Black is vice-president, and is well known for his achievements in the designing of manganese and chrome steel castings for use in steel mills, ore docks and blast furnaces.

Eugene C. Bauer, vice-president, has had 16 years of sales experience in the manganese steel business, which includes a general knowledge of engineering and manufacturing.

J. W. Plant, also a vice-president, has devoted many years of his life to the manufacture and sale of carbon and manganese steel castings on the Pacific Coast.

With Alfred H. Exton as chief engineer, and Claude Rorabeck as consulting engineer, the company is able to offer to its customers an excellent engineering service, combined with a thorough knowledge of steel foundry practice which only comes through years of untiring effort and experience.

HUNTINGTON, OCTOBER 8, 1932

THE HUNTINGTON PRESS

# STONE

the MOST familiar object on earth, and yet, VERY FEW PEOPLE KNOW  
ANYTHING about the quality of Stone

The first impulse is to suppose that anybody can judge the grade and value of stone—and a great many people do presume to know about it—but those who have had the widest experience realize that there is nothing more difficult than to determine the quality and serviceability of this familiar composition of the earth. For some years the

## ERIE STONE COMPANY

was engaged in stripping the top layers from the surface of their quarries and some of the product was less hard than others.

### This Layer Has Been Totally Removed

And the stratum has been reached which furnishes to the consumer one of the MOST DURABLE STONES TO BE FOUND ON THE FACE OF THE EARTH. This stratum has the extraordinary depth of more than four hundred feet and consists of a perfect bed of HARD, TOLICH LIMESTONE.

We have studied the requirements of the Public, and with our modern equipped plant we are prepared to furnish our customers what they want when they want it in the line of crushed Rock Products.

SIZE NO. 1 is especially adapted for foundation course for Masonry, and surface treated roads.

SIZE NO. 2 is often used instead of the coarser material in the foundation course for Macadam and surface treated roads; also is the size most extensively used for railroad ballast.

SIZE NO. 3 is used in the wearing course of surface treated roads; the size being especially adapted for the penetration of the asphalt or other preparation. This is also the size used in heavy concrete wall and foundation work.

SIZE NO. 4 is extensively used in expensive old gravel roads. The newly laid wearing surface of the material presents itself, for after a few weeks travel the stone becomes firmly embedded in the old road bed, presenting to the traveler a smooth, hard, durable, desirable surface which will withstand the hard usage of winter and spring travel.

### STANDARD SIZES

Our Size No. 1.—2½ inches to 4 inches.

Our Size No. 2.—2 1½ inches to 2½ inches.

Our Size No. 3.—1½ inch to 2½ inches.

Our Size No. 4.—½ inch to 1 inch.

Our Size No. 5.—½ inch to 1 inch.

Our Size No. 6.—¼ inch to ½ inch.

Our Size No. 7.—¼ inch to ½ inch.

Agriculture Limestone.

We can mix any of the above sizes in proper proportion to suit requirements.

SIZE NO. 6 is the size used on the "carpet coat" on surface treated roads, also in place of road gravel and for light repair work.

NO. 7 is a clean, sharp limestone sand and its use is recommended by the State Highway Department of Ohio for concrete work any place where other sand or gravel of like specifications can be used. The top of the ledge of limestone on which we are working is more than 40 feet below the original surface of the rock, and the product is absolutely free from clay or other foreign matter often found in the limestone sand of quarries working a surface cut.

AGRICULTURAL LIMESTONE is finely pulverized limestone testing high in Calcium Carbonate and Magnesium. The Agricultural Experiment Station of Purdue University is using Pulverized Limestone exclusively in their work of correcting soil acidity and your County Agricultural Agent has recommended the use of Agricultural Limestone.

## THE ERIE STONE COMPANY

C. W. McKEE, SALES MANAGER

HUNTINGTON, IND.

PHONE 431

### Page Ad About Stone

Stone was the subject of an unusual page advertisement run by the Erie Stone Company of Huntington, Ind., when a paper in that city got out a special issue.

The advertisement proceeded to say:

"The first impulse is to suppose that

anybody can judge the grade and value of stone—and a great many people do presume to know about it—but those who have had the widest experience realize that there is nothing more difficult than to determine the quality and serviceability of this familiar composition of the earth.

"For some years the Erie Stone Company was engaged in stripping



the top layers from the surface of their quarries and some of the product was less hard than others. This layer has been totally removed and the stratum has been reached which furnishes to the consumer one of the *most durable stones to be found on the face of the earth.* This stratum has the extraordinary depth of more than four hundred feet and consists of a perfect bed of *hard tough limestone.*"

Then the bottom half of the page is divided into little panels each telling of the uses of the seven sizes and also of agricultural limestone. Another panel gives the seven standard sizes.

It is educational advertising of a type not often seen and as it was attractively set up got attention.

## News Items

The Gypsum Products Co., of Alamogordo, N. Mexico, has been incorporated with a capital of \$100,000. The incorporators are J. G. Barrett and J. W. Fetz of Alamogordo and C. L. Beatley, of Long Beach, Calif.

Lake Weir Crystal Sand Co., Ocala, Fla., has been incorporated with a capital stock of \$25,000. Officers and directors: Nathan Mayo, president; L. W. Duval, vice-president; Dempsey B. Mayo, secretary and treasurer.

The Morgan Sand & Gravel Company, Brooklyn, N. Y., has increased its capital from \$25,000 to \$50,000.

The Fort Worth Sand and Gravel Co., Fort Worth, Texas, has been incorporated with a capital of \$200,000. Incorporators: R. M. Quigley, H. P. Bonner, J. O. Hart.

The Mississippi Lime & Material Co., of Alton, Illinois, has plans under way for the erection of a modern, fire-proof office building, construction on which will be begun at an early date.

The Shepherd Sand and Gravel Co., Shepherd, Texas, have increased their capital stock from \$13,000 to \$40,000.

The erection of an immense plant is planned by the Arizona Portland Cement Co., of Phoenix, Arizona, which was recently organized with a capital of \$1,000,000.

The Eyre Gravel Co., Seattle, Washington, has been incorporated with a capital of \$200,000. Incorporators: E. G. Helgesen, A. C. Peters and R. H. Evans.

One thousand acres of land, south-east of Oakfield, N. Y., has been pur-

chased by the United States Gypsum Company, to provide for future mining developments.

The Yahola Sand and Gravel Co., of Fort Gibson, Okla., has commenced work on its new plant at Tuskogee, Okla. Orders for machinery and equipment have been placed and when the plant is completed, sand and gravel to meet any specification can be produced.

The Cape Fear Gravel Pits, Inc., has been organized at Lillington, N. C. and will immediately begin the mining of gravel and the manufacturing of cement products on a large scale. The home offices of the company will be in Lillington, but general sales offices will be maintained in Raleigh, N. C. and Richmond, Va. The officers of the Cape Fear Gravel Pits, Inc., are: President, C. W. Lacy; Vice-president, T. H. Higgs; Secretary, H. R. DeLorme; Treasurer, J. C. Blanchard.

The Monroe Sand and Gravel Company has been organized at Monroe, La., with a capital of \$25,000. This company proposes to operate the Ouachita gravel beds which are among the richest gravel beds in Louisiana. The board of directors consists of T. E. Stephenson of Monroe, who is also president, J. A. Stephenson of Shreveport, vice-president and R. O. Randler of Monroe, secretary and treasurer.

The Cook County Sand & Gravel Co., Chicago, Ill., has recently been incorporated to deal in building material and products. Incorporators: Geo. F. Leibrandt, Chas. A. White, and Oscar W. Rosenthal. The company maintains offices at 224 S. Michigan Avenue.

Edward F. Alden, of Capay, California, has plans under way for the installation of a gravel pit on Cache Creek, not far from the town. It is planned to construct a washing plant, where the gravel will be washed, graded and placed in bins.

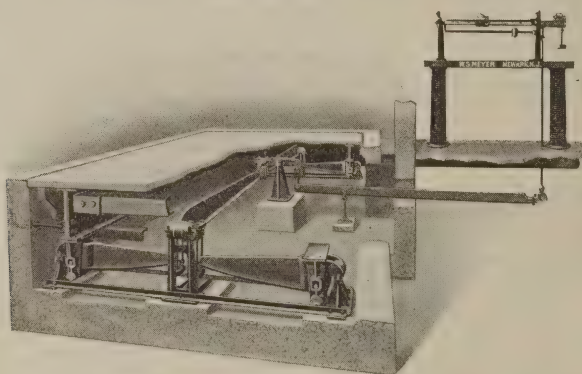
The Sun Portland Cement Co., Portland, Oregon, recently organized with a capital of \$1,000,000, are planning to establish a plant at Home, Idaho, on the Oregon side of the Snake River, with a capacity of 1,000 barrels daily. The officers of this company are H. A. Ross of Victoria, B. C., president; L. C. Newlands, vice-president; Geo. L. Macdonald of Portland, secretary and H. L. Knappenberger of Home, Idaho, treasurer.

## Motor Truck Scales

Some of the big eastern stone quarries have recently installed motor truck scales, manufactured by Wm. S. Meyer and sold by the Edwin A. Meyer Sales Company, 473 Washington St., Newark, N. J.

These scales have a capacity of 25 tons and are of suspended, all-steel platform construction, 9x20 feet in size.

The levers of this scale are on delicate knife edge suspensions and the



beam, as stated by the manufacturers, will turn in one ten-thousandth of its capacity.

All bearings have heavily reinforced with metal backing and the bearing blocks are removable and easily replaced. The design is such that the knife edge and bearings are in continuous contact, regardless of any movement of the platform, guaranteeing long life, sensitiveness and accuracy. It is equipped with full compound beam and office stand.

## Book on Spiral Pipe

An extensive catalogue on spiral riveted pipe has just been issued by the American Spiral Pipe Works, 14th St. and 48th Avenue, Chicago.

The initial pages of the catalogue are devoted to a description of the method of producing Taylor's spiral riveted pipe, which has for many years, been in use in the various industries. The pages following show photographically many of the most notable installations of this pipe, with the expressions of appreciation from the users.

The catalogue is also so constructed mechanically, that one may instantly

turn to the price lists which have been grouped in the most logical order, a feature which will be much appreciated.

Several pages of the book have been devoted to an excellent collection of valuable hydraulic tables and charts.

The book also includes reference to some of the more recently developed lines of this company, such as forged steel flanges, large diameter forge welded pipe, etc. This book is being sent out free to the trade.

## Announcement

The Standard Conveyor Company, North Chicago, Ill., announces that it has acquired by purchase all the rights, titles and patents pertaining to the well-known "Brown Portable" line of portable and sectional piling, elevating, conveying, loading and unloading machinery for the handling of packed and loose materials.

This line of machinery has been manufactured by the Brown Portable Conveying Machinery Company at North Chicago for ten years. Until further notice the plant will be continued in operation by the Standard Conveyor Company.

The Mackintosh Engineering Company, located in the Schofield Bldg., Cleveland, have been appointed agents for the Brownhoist small cranes, buckets and storage bins for the state of Ohio, with the exception of Hamilton County.

The Chain Belt Company, Milwaukee, announces the appointment of Fitch S. Bosworth as manager of the Chicago Office, effective January 1st. Mr. Bosworth has been in charge of the Chain Belt Company's St. Louis office for the last three years and has specialized on chain and conveying engineering problems. With him will be associated Raymond X. Raymond who for several years has been connected with the Export sales department in Milwaukee. Thomas F. Scannell, formerly of the Chicago office has been placed in charge of the St. Louis office.



## A New Shovel

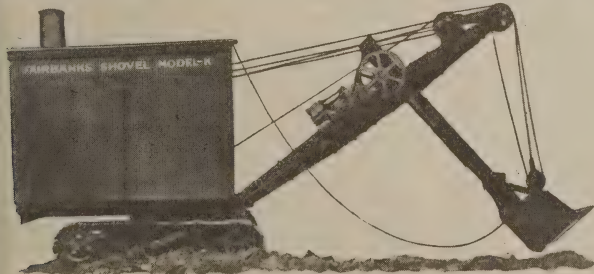
The Fairbanks Steam Shovel Company, Marion, Ohio, has recently brought out a new  $\frac{3}{4}$ -yard contractors' shovel known as Model K.

This new machine is complete in every detail, but at the same time is simple in design and operation and rugged and well proportioned in construction. Full revolving swing, flexible endless tread traction. Fairbanks submerged tube A.S.M.E. boiler, reversing valve engines, two speeds of travel, insuring positive and economical moving, power boom hoist—to change standard boom immediately to any angle, power steering device—operated from cab, is regular equipment with this new shovel. It is also adapted for electric or gasoline engine power, as well as steam.

Another new feature used with Model K shovel is the horizontal digging boom and dipper handle. This boom arrangement is particularly adapted to road and street construction and stripping. A much longer reach and dumping range can be obtained with this boom, and the highest trucks and wagons can be easily loaded.

The boom arrangement is the only difference in design from the standard Model K, and change from one type of boom to the other can be quickly made on the job. In this model the user has his choice of power for operation and also boom arrangement with very little variation from the standard machine. These shovels are making some excellent records and the company is in receipt of some very complimentary letters from men using this shovel.

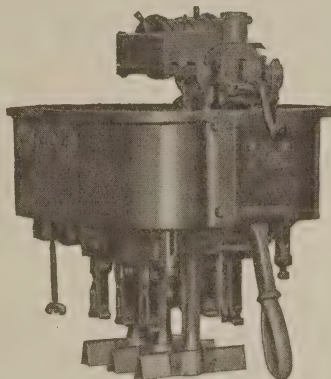
A new circular on this shovel No. K-10 has just been issued and will be gladly mailed to interested parties upon request.



## New Oil Circuit Breakers

A new line of oil circuit breakers, the type F-10 designed primarily for industrial applications, such as in mines and in textile, cement, and flour mills, has been placed on the market by the Westinghouse Electric & Manufacturing Company.

The new breakers are of moderate interrupting ability and are made in capacities up to 200 amperes at 2500 volts and 300 amperes at 750 volts. They are wall-mounting breakers, designed for indoor service only. As they are dust-proof and drip-proof, they



may be used in textile, flour and cement mills where dust is encountered and in mines where there is excessive moisture.

All type F-10 breakers are manually-operated and may be either non-automatic or automatic. The breaker is held in the closed position by a hardened steel roller, which is tied on the trigger so that when the trip coil is energized the trigger is raised, disengaging the latch and allowing the breaker to open. When the breaker is used non-automatic, it is tripped by raising the closing handle. When the breaker is in position, the operating handle is vertical and when the breaker is opened, the handle is raised slightly. It is thereby possible to determine the position of the contacts by the position of the handle.

Automatic operation is obtained by the addition of one or more automatic trip attachments.

## Recent News Notes

The Liberty Marble Co., 80 Granite Street, Boston, Mass., has work under way on a new one and two-story plant, 80x122 feet, comprising shop and office building, in the Dorchester section, estimated to cost about \$25,000. Equipment will be installed for polishing, finishing, etc.

There has been a marked improvement in the slate industry at Monson, Me., and vicinity during the past six weeks. A number of quarries which have been shut down owing to lack of orders have reopened, and business in hand indicates that full production can be continued for a number of months. The Monson Slate Co., is drawing heavy on the supply from the local quarries.

The Eastern Marble Co., Rutland, Vt., has arranged for a bond issue of \$525,000, a portion of the proceeds to be used for general expansion in operations and business. The company has been maintaining production at its plant at good status, with large working force.

The American Black Marble Corporation, 1974 Broadway, New York, has been organized under Delaware laws with a capital of \$200,000, to operate marble quarries and finishing plants. The company is represented by the United States Corporation Co., 65 Cedar Street, New York.

The Gomez Granite Corporation, 1974 Broadway, New York, has arranged for an increase in capital from \$100,000 to \$250,000, a portion of the proceeds to be used for proposed expansion.

The Albany Gravel Co., Albany, N. Y., has been organized under state laws with a capital of \$50,000, to operate sand and gravel properties in this section. The company is headed by C. W. Maxwell and G. K. Smith. It is represented by Ainsworth, Sullivan, Wheat & Archibald, attorneys, Albany.

The Lautz Marble Co., Buffalo, N. Y., has work in active progress on its new plant on East Ferry Street, and expects to have the structure ready for service at an early date. It will be one-story, 110x480 feet, with two-story office, adjoining, 40x88 ft., forming one of the most complete plants of this kind in this section. It will be equipped with grinding, cutting and polishing machinery of modern type. R. K. Glass is president.

The Morgan Sand & Gravel Co., Brooklyn, N. Y., has arranged for an increase in capital to \$50,000, for general expansion.

The Quality Sand & Gravel Co., Springfield, Erie County, N. Y., has been formed under state laws with a capital of \$100,000, to operate sand and gravel properties in this section. The company is headed by D. H. Ames, S. G. Engel and P. W. King, all of Springfield. It is represented by Scott & King, Springfield, attorneys.

F. E. Waite, Inc., Albany, N. Y., has been organized under state laws by F. E. Waite and associates, with capital of \$12,000, to operate a stone quarry in this vicinity. Others interested include A. Bran and P. E. McCabe. Extensive production is planned. The company is represented by S. E. Aronowitz, Albany.

The United States Gypsum Co., Oakfield, N. Y., has added to its holdings in this section, comprising about 1,000 acres of farm land, heretofore held by Judge Edward A. Washburn; title has just been taken. A vein of gypsum extends under the property, and extensive development work will be placed in progress at an early date. New York offices of the company are at 1170 Broadway.

The quarry properties of the Koons Lime Stone Quarry, Camp Hill, Cumberland County, Pa., and the Williams Grove Quarry, Carroll Township, York County, Pa., will be disposed of by S. E. Vance, receiver, Chestnut and Marion Streets, Camp Hill. The quarries and equipment are said to be under profitable operation at the present time, being leased by the respective companies.

The Pennsylvania Construction, Stripping & Quarry Co., Hazelton, Pa., has commenced operations in the vicinity of Cranberry, Pa. A new stripping will be developed for local interests.

The Coopersburg Granite Co., Coopersburg, Pa., is being organized by local interests, including A. W., and Charles D. Bradford, and Victor Riu. The company will soon take out a state charter and propose extensive operations on local property. A complete cutting, finishing and polishing plant will be operated. The new organization is represented by C. William Freed, Quakertown, Pa.



## One-Man Shovel

A miniature steam shovel, so versatile and easily handled as practically to eliminate hand loading in quarries and mines, is made by the Hoar Shovel Company, Duluth, Minn.

The shovel is fully revolving—capable of duplicating any action of the steam shovel—and requires but 6 ft of headroom and a width of 6 ft. in which to operate. Power is supplied by three reversible Duke motors operating by compressed air or steam. Use of these reversible motors makes it unnecessary to employ clutches and gives a quick, positive action.

Operation is through three levers directly in front of the operator, who can see every movement of the dipper. The dipper itself, patterned after the standard steam shovel dipper, is fastened to a dipper stick which is in turn connected to a double floating dipper



stick that permits flexibility in cleaning up a rough bottom and allows the dipper stick to be racked back over the body of the machine before swinging in congested places. When dumping, the crowding engine shoves the dipper sticks out in a horizontal position over the car and then racks it back again to the body position for the return swing.

One man is all that is necessary to operate, the shovel doing its own cleaning up, trimming of cars and propelling itself over short distances by dropping the dipper against the side of the drift or on the ground and crowding out. The saving this machine will make over hand labor is calculated at

50 per cent and the speed of the loading operation increased nearly as much.

## Month's Sale of Explosives

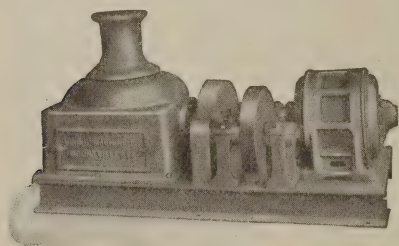
Reports made to the United States Bureau of Mines from manufacturers of explosives in the United States show that sales during October were slightly below the September record in the case of black powder and permissibles but that sales of dynamite and other high explosives increased somewhat over the previous month. The reports for October indicate total sales of 793,105 kegs of black powder, 4,692,050 pounds of permissibles, and 18,139,118 pounds of other high explosives. Total sales of black powder for the first ten months of 1922 aggregate 4,725,343 pounds, which is 7 per cent above the corresponding period last year, but 43.5 per cent below the record for the first ten months of 1920. Of the total quantity of black powder sold thus far in 1922, the coal mining industry has consumed 84 per cent and other kinds of mining have used 3 per cent. The remaining 13 per cent was used for construction purposes and miscellaneous classes of work. During the first ten months of the current year, 29,788,377 pounds of permissibles have been sold for use in the United States, representing a loss of 2.5 per cent below the corresponding period last year, and a loss of 34.0 per cent below the same months in 1920. Of this quantity coal-mining has consumed 91 per cent, while other classes of mining work have used 4.5 per cent. Construction and miscellaneous work used the remaining 4.5 per cent. Since the beginning of the present year, 158,515,562 pounds of high explosives have been sold for use in the United States, representing a gain of 15.0 per cent over the corresponding period last year, but a reduction of 19.9 per cent from the ten-month record in 1920. The metal-mining industry is the largest single consumer of this class of explosives, nearly 40 per cent of the ten-month sales in 1922 having been used in metal-mining operations. Coal mining has used about 11 per cent, railroad and construction work 12 per cent, and miscellaneous work 37 per cent.

## Gunite as a Fire Preventive

Tests made by the Bureau of Mines at the University of California, Berkeley, Cal., indicate that Portland cement-gunite will stand up in a hot fire. The guniting of timbers will prevent the starting of a mine fire in, or the spread of flames through, the gunited section. The magnesium-oxy-chloride-cement-gunite slabs did not stand up under the fire test; the gunite crumbled to powder and scaled off, permitting the slabs to ignite. It is reasonable to conclude that headframes, shaft collars, shaft timbers, shaft stations, in fact all timbering permanent underground workings—including mule barns, ventilation doors, power stations, hoist stations, timbered haulage-ways, and fan stations—can be effectively fireproofed by gunite coatings. On the surface, transformer houses, assay offices, powder magazines and other buildings can be fire proofed by gunite coatings; or the building can be made entirely of reenforced gunite.

## Handy Car Puller

The Mining Machine Company, Mountville, Pa., has on the market a



serviceable, compact car puller, for the spotting or replacing of cars, either loaded or empty.

A bulletin issued by the company shows types and sizes to meet many different needs.

Mr. A. R. Ulbrich, formerly sales manager of the Terry Mfg. Co., Inc., has been appointed sales manager of the National Hoisting Engine Company of Harrison, New Jersey. He assumed his new duties January 1st, 1923.

## Improve Sturgeon Bay Quarry

Extensive improvements are now being carried out at the Leathem D. Smith Stone Company's mammoth quarry at the mouth of Sturgeon Bay, Wis. When the present plans are carried out the plant will be one of the best equipped and largest in the Great Lakes region.

One of the big improvements is the installation of a 200-ton McCully gyratory crusher, which has a capacity of from 700 to 1,400 tons of stone per hour. The production of the plant with its present equipment is about 150. This crushing outfit will do away with the usual reblasting.

Another large steam shovel will be added. Additional graders and electrically controlled conveyors will carry the various sized stone to its proper storage space. The entire plant will be electrically driven.

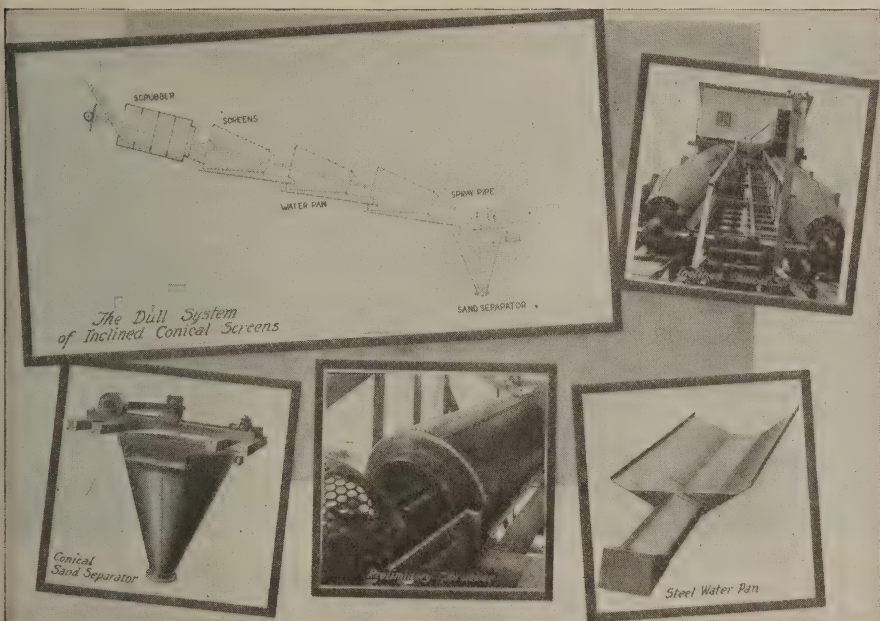
Over eighteen million dollars worth of minerals was taken from Alaska mines in 1922, which brings the output back to figures of almost the pre-war magnitude. According to estimates made by Alfred H. Brooks, Chief Alaskan Geologist, United States Geological Survey, the value of the mineral output of Alaska in 1922 was—gold, \$7,720,000; copper, \$9,000,000; silver, \$730,000; and coal, \$450,000; the total value, including that of lead, platinum, petroleum, marble, and gypsum, was \$18,250,000, compared with \$17,000,000, the value of the output in 1921.

S. W. Lindheimer, dealer in Railroad and Contractors Equipment, Chicago, sailed on January 6th on the Majestic for England, to develop a large deal in pending for some time.

The Directors of Gifford-Wood Co. Hudson, N. Y., at a recent meeting, appointed Joseph A. Boucher to the position of sales manager to become effective at once.

The Merrell Quarry Co., Box 457, R. R. No. 3, East St. Louis, Ill., has been incorporated with a capital of \$6,000. Incorporators: Spencer A. Merrell, Lela C. Merrell and J. P. Wharry.





## GET YOUR EQUIPMENT READY FOR SPRING

BE ready to start operations as soon as spring opens up.

A bit of planning during the winter months, for replacements and additions, will mean maximum production when your plant starts next season.

The Link-Belt Company builds sand and gravel handling equip-

ment that assures a high grade product.

Link-Belt equipment has proven its sturdy qualities and efficiency in production in hundreds of plants, and deserves your consideration when you buy new units.

Link-Belt experienced engineers will be glad to assist you.

*Send for Book No. 440*

LINK-BELT COMPANY

Chicago—300 W. Pershing Road

Philadelphia—Hunting Park Ave. & P. & R. Rwy.

# LINK-BELT



This Shows a Sauerman "Junior" Cableway with Gasoline Power Unit Mounted on Road Wheels. It is opening up an Abandoned Pit Which had been Worked Previously with Teams Until the Water-line was Reached

### "Junior" Cableway

For light material-handling, such as excavating gravel for road-building, digging marl, handling sand at concrete products plants, and so forth, Sauerman Bros. announce a new model cableway with gasoline or belt drive hoist mounted on road wheels.

The new machine is called the Sauerman "Junior" cableway and is manufactured in three sizes, with 6, 9 and 13 cu. ft. buckets. All have operating spans of 300 ft.

While the new machines are low in cost, they are said to be equal to the standard Sauerman dragline cableway excavators in design and construction, only they are lighter and semi-portable.

Complete information on the "Junior" cableways, including specifications, is given in Bulletin No. 123 just issued by Sauerman Bros., 434 S. Clinton St., Chicago, who will send copies free to all who so request.

### Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at

the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,439,216. Power-shovel. Edwin J. Armstrong, Erie, Pa.

1,439,252. Coal screening and washing machine. William F. Martin, Wormleysburg, Pa.

1,439,431. Coal-washer jig. Louis MacKenzie and William Richardson, Jr., Ensley, Ala.

1,439,754. Crusher and pulverizer. Harold M. Plaisted, S. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.

1,439,781. Crusher. Milton F. Williams, S. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.

1,439,800. Mammer-rod for crushers. William M. Davidson, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.

1,439,872. Cage-partition plate for crushers. William M. Davidson, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.

1,440,212. Base for dipper-teeth. John F. Devlin, High Bridge, N. J., assignor to Taylor-Wharton Iron & Steel Co., same place.

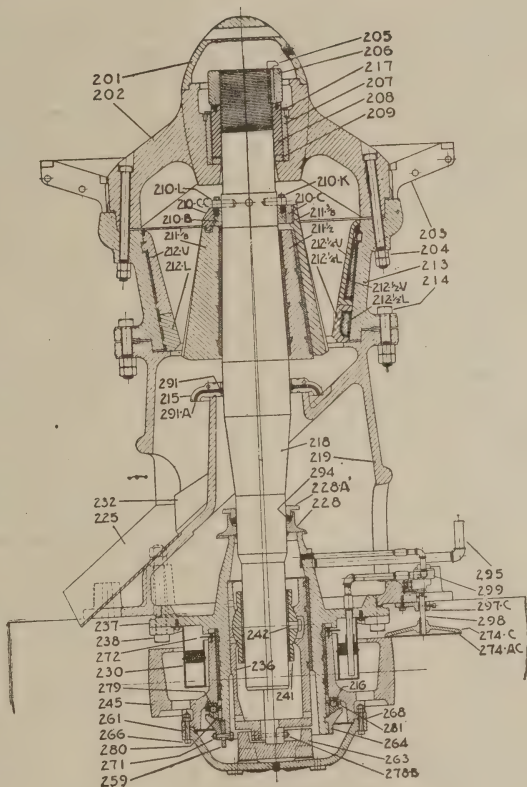
1,440,429. Breaker-plate for crushers. Arthur F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., same place.



# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 0—Made in our own shop by experts, trained for the job.



- 1—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 2—Our fine crusher does the work of 4 geared crushers.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

**KENNEDY VAN SAUN MFG. & ENGR. CORP.**  
**20 Broadway** **NEW YORK**  
 CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS

## Recent Patents

The following patents of interest to readers of PIT AND QUARRY recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,435,920. Loading-machine. Robert P. Greenleaf, Cleveland, Ohio.

1,436,101. Crushing and pulverizing machine. Joseph L. Hiller, Mattapoisett, Mass.

1,436,338. Crusher. Charles I. Carman, New York, N. Y.

1,436,347. Crusher. George E. Krider, Hollidaysburg, Pa., assignor to McLanahan Stone Machine Co., same place.

1,436,470. Rock-drill. Joseph Beaudry, Philadelphia, Pa.

1,436,590. Mill or machine for grinding or pulverizing ore and other materials. Ralph Hush, Johannesburg, Transvaal, South Africa.

1,436,638. Air-feed control for rock-drills. Lewis C. Bayles, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,436,737. Safety device for steam shovels. Lee Trower, Wilkinsburg, Pa.

1,437,392. Grab-bucket. Henry W. Botten, Lakewood, Ohio, assignor to Owen Bucket Co., Cleveland, Ohio.

1,437,526. Mining and loading machine. Nils D. Levin, Columbus, Ohio, assignor to Jeffrey Mfg. Co., same place.

1,437,545. Combination excavator and pile driver. Joseph Perna, Philadelphia, Pa.

1,437,594. Excavating-machine. Stephen Kelly, Louisville, Ky.

1,437,669. Coal-screening and washing machine. William F. Martin, Wormleysburg, Pa.

1,437,755. Rotary drilling apparatus. Edgar E. Greve, Bellevue, Pa.

1,437,863. Feeding device. Fred I. Raymond, Evanston, Ill., assignor to Raymond Brothers Impact Pulverizer Co., Chicago, Ill.

1,437,963. Excavating-bucket. Samuel Dyke, Houston, Tex.

1,438,001. Reversible dipper-tooth. Leshner W. Van Buskirk and Philip W. Porter, High Bridge, N. J., assignors to Taylor-Wharton Iron & Steel Co., same place.

1,438,125. Coal screening and washing machine. William F. Martin, Wormleysburg, Pa.

1,438,126. Self-dumping screening and washing machine. William F. Martin, Wormleysburg, Pa.

1,438,183. Conveying apparatus. Louis E. Laurent, New York, N. Y., and James C. Patterson, East Orange, N. J.

1,438,332. Excavator. Charles H. Ruth, Huntington Park, Cal.

1,438,608. Excavating cableway. Thomas S. Miller, South Orange, N. J.

1,438,701. Drag-line excavator. Joseph F. Fitzpatrick, Worcester, Mass.

1,438,752. Power-shovel. Henry L. Doering, Erie, Pa., assignor to Ball Engine Co., same place.

## Raise Capacity to 5,000 Pounds

At a recent meeting of the directors of the Southwestern Portland Cement Company, decision was reached to enlarge the present capacity of the plant to 5,000 barrels per day, making it one of the largest plants in the west.

The contemplated plans for the enlargement of the plant include the installation of another kiln, a new rock crushing plant, new finish mill, enlarging of the clinker bins, installation of an electric crane for handling clinker in place of the steam crane now employed, enlarging of the powerhouse to accommodate the extra motors required for driving the new mills, the construction of four more new slurry tanks, and a number of other small alterations.

Work has already been started on the foundations for the extension of the mill building, and workmen will soon be busy preparing the heavy cement supports for the new kiln, which has been ordered in the east.

The International Cement Co., 1834 Broadway, New York, is maintaining a heavy rate of production at the former mill of the Knickerbocker Cement Co., acquired about a year ago. The plant has been entirely remodeled and improved, and considerable additional machinery installed for greatest economy and efficiency in manufacture. The company has shown a steady progress in the line of earnings during the past year and is said to have accumulated over \$1,000,000 in bank balances with no current liabilities.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lim

Vol. 7

CHICAGO, ILL., MARCH, 1923

No. 6

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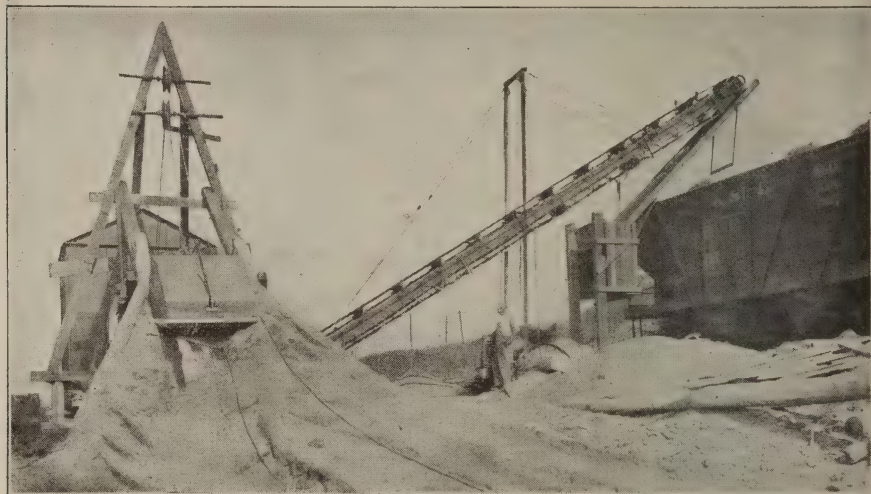
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*Barber-Greene 60 Foot Conveyor used for loading sand from a beach plant.  
Send for Gould cost report "N"—on its performance*

## Reaching 30 Feet Farther Than a Crane

The R. C. Products Trust of Cleveland found that a locomotive crane used to load sand into railroad cars from a Lake Erie beach was decidedly unprofitable.

Its reach was too short. The beach was 90 feet wide between the shore and the railroad embankment. The crane got the sand and gravel within 20 feet of the embankment, but that was as far as it could go.

It was finally replaced with a 60 foot Barber-Greene conveyor, having a reach fully 30 feet longer than that of the crane. This conveyor has now been in use for two years and has shown decidedly satisfactory earnings as compared with the crane.

One day last summer a tornado picked it up, carried it twenty feet, and dropped it upside down without doing any material damage. It is outdoors in the snow all winter, and several times storms have half buried it with sand.

In spite of these conditions, and the fact that it handles wet sand most of the time, it is still in excellent condition and the original belt seems to be good for another year.

Our Gould cost report "N", sent on request, gives definite and detailed cost data on the operation of this conveyor.

**Barber-Greene Co., 490 W. Park Ave., Aurora, Ill.**

*Offices in Thirty-three Cities*

**BARBER**  **GREENE**  
Portable Belt Conveyors Self Feeding Bucket Loaders



# Pit *and* Quarry

Vol. 7

Chicago, Ill., March, 1923

No. 6

## Engineering Principles Applied to Quarries

AT THE Chicago Convention of the National Crushed Stone Association, Mr. Oliver Bowles, mineral technologist of the United States Bureau of Mines, presided over one of the sessions and read a paper on quarries. A short report of this paper has already appeared in PIT AND QUARRY, but it is desired to stress the main features and principles as laid down by Mr. Bowles.

This journal has from its inception advocated emphatically that if all the money possible is to be made out of a quarry operation, sound engineering principles must be the basis of every detail. In stating this, that definition of engineering, as laid down by the late A. M. Wellington, is borne in mind, namely, "An engineer is a man who can do with one dollar what any bungler can do with two dollars after a fashion."

We are glad to have Mr. Bowles approve the work this journal has been endeavouring to do, as no one is better qualified to speak on quarrying than this expert, who has had behind him all the resources of the Bureau of Mines in conducting a series of studies of the quarry industry over a long term of years.

Mr. Bowles set forth that many problems regarding quarrying as considered from an engineering standpoint could be solved by the operator himself, but he also stated that there are times when problems may require the experience and knowledge of a trained

engineer or an expert who should be called in consultation.

Like this journal, he advocated that operators should get out of their beaten track, and learn of improved and modern methods, completely dismissing from their minds consideration of any preconceived opinions as to the most desirable solutions of their problems.

The basis of engineering principles is to have exact knowledge of everything that is done, and this is possible for every quarryman. Records can be kept of every detail of the work, the yardage excavated, the tonnage sold, and every detail of cost. These and many other details would be the basis that any engineer would use, and it is possible, if every operation is started properly, for him to have kept such records, and have them analyzed and used to make additional profits.

## Overhead During Idle Months

EVERY producer of sand and gravel and stone, who shut down his plant during the winter months should remember that he does not by so doing eliminate all of his expenses. Some men may have to be carried on the pay rolls, there are certain repairs to be made, and improvements and additions are planned and built.

Thus, without production and sales, these items become an overhead charge, and must be so recorded as to be distributed over those months that cover production.

To ignore such charges frequently

means that a loss is sustained on the operation for the year. If carried in the proper way such a price can be placed upon the product as to cover these items and still make a profit.

Too many operators still figure a selling price based upon the cost of production when the plant is running, but this is not sufficient, for all the expenses for the year must be considered, in arriving at the basis of a selling price.

Thus, idle months must be figured in as well as the busy ones. If a plant does not pay upon such a basis, then the plant or operation must be wrong or else the time has arrived to abandon the operation.

---

**W**HEN electricity is used in pits and quarries there are two general methods of applying the power to the various machines.

One is that generally used with steam, of setting up one or two large motors and by belt transmitting the power to a main shaft and from it by pulleys to the individual machines. This saves a boiler and engine, the purchasing of coal, as well as the salary of a fireman; but there is still an excessive use of long belts and power transmission chains, and the waste of power in turning the shaft and the various pulleys. This means a higher cost for power than by the other method to be described, and a great upkeep for belts, pulleys, bearings and other details.

The second method is to use a motor for each machine or unit. In this case the motor is set upon a solid base close to the machine to be operated, and is either direct connected or a short belt is used. With this kind of a layout one machine can be operated independently of others. A screen can be run with the crusher idle, or a washer can be operated without running an elevator. Thus power is saved, for only those machines are run that

are needed. There is no need of shafts or pulleys, and if belts are needed they are short; but in some cases, especially with pumps, the motors are direct connected, thus eliminating the belt.

With electricity the whole layout by this method can be very flexible, yet each machine can be operated at its top speed. It is necessary, though, to carry the wires through the entire plant. For this they should be well protected and should be installed so as to eliminate all chance of short circuits, with the attending danger of fires. This means to follow the fire underwriters' rules and specifications for wiring. Switches and fuse boxes should be plainly marked, and signs telling of the danger of playing with them.

A very small motor—1 or 2 h. p., or less—can be bolted to heavy timber as a base, but larger motors should be set up on a concrete foundation. In all cases motors should be protected from the weather. This means a roof and sides on the building they are in, and in many cases it is advisable to have a hood over them. This is not only a further protection from the weather, but prevents dust and dirt from getting into the motor, and men from being injured by it.

For belt conveyors and other types of similar machines the individual motors can frequently be set under the conveyors, so they are not only out of the way, but do not take up floor space that may be needed for other purposes.

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The Monolith Cement Plant of Monolith, Cal., has forwarded to all stockholders dividend checks paying 8 per cent on both common and preferred stock. Secretary-treasurer Wilbur Evans reports the most successful year in the company's history has just closed but predicts that 1923 will be the greatest year in California's history in regard to cement consumption and production.



## Springtime Danger of Explosives

IT IS during the spring time of the year that the greatest risk is run of accidents, due to the handling of explosives, especially those that have been stored during the winter. Freshly made explosives that have been stored in a properly heated magazine should be as safe to handle as any ordinary explosives, but there is always danger in explosives that have been stored in magazines that are heated too much; or in those that are not heated, and thus allow the explosives to freeze and thaw according to the vicissitudes of the weather.

Inasmuch as most quarrymen store their explosives in unheated magazines, they run considerable risk of having accidents during the early months of the spring, when they begin their operations for the new year. A word of warning may prevent some serious accident, for here ignorance cannot be called bliss, as many men have lost their lives due to ignorance regarding explosives.

The greatest danger from an overheated magazine with a nitroglycerine dynamite is due to the fact that the nitro glycerine can become so soft and liquified, as to run together and form small globules. This means that the glycerine is no longer held in suspension by the dope used in the dynamite. The danger arises from the fact that a slight jar may detonate the free nitro glycerine, which can explode the entire stick of dynamite. Evidence of the running of nitro glycerine from the dope is frequently shown by stains upon the wrappers of the dynamite, causing them to look dirty and greasy. However, free nitro glycerine may still be in the stick without showing any evidence upon the wrapper. For this reason all dynamite so stored should be examined carefully when it is taken out of the magazine to be used.

As already stated, most explosive

magazines are not heated, thus quarrymen face two chances of accident, due to frozen explosives and those that may have free nitro glycerine in them. In a climate where there are frequent spells of excessive cold weather followed by a much warmer temperature, dynamite can first freeze and then thaw. It is this successive congealing and liquifying of the nitro glycerine due to successive changes that causes the dynamite to deteriorate, or, to use a common term, to become "rotten," which simply means that there may be free nitro glycerine in the stick.

The action is just the same as with dynamite that has become overheated. The same thing occurs in thawing frozen dynamite, especially if it is allowed to become too warm. It is for this reason that dynamite should never be thawed near an open fire, or on a boiler or on a stove. Nor it is advisable to thaw it in hot water as the excessive heat of the hot water can cause the nitro glycerine to percolate from the stick of dynamite into the water, when an explosion can occur if the receptacle with the water in it is not handled with great care.

Hard congealed dynamite will not explode very easily, but if it is made soft and mushy there is great danger of premature explosion. Thus in thawing, the regular thawing kettle should be used so that the dynamite is only heated enough to make it workable.

As already stated, stained wrappers will sometimes tell the tale of deteriorated dynamite. A better way is to cut the stick or remove some or all of the wrapper and expose the dynamite to the air. With nitro glycerine goods a greenish hue will come over the dynamite showing that it is becoming bad and that it is dangerous to handle.

These are some of the things to be aware of in the spring of the year when left-over dynamite is to be used.

# A Business Transaction as It Happened and as It Should Have Happened

By ELTON J. BUCKLEY

One observation I am fond of making is that the difference between protecting one's self in a business transaction and not protecting one's self is often very slight; it is often necessary to do only a few little things in order to be safe. What is lacking is not the energy to do the protecting, but the knowledge.

To illustrate this, I am going to cite the details of a case which happened under my own eyes. I shall give the facts as they occurred, and then restate them as they should have occurred—and doubtless could have been made to occur—in order to give complete protection to a buyer who is now the victim of his own short-sightedness.

## How the Incident Occurred

The plaintiff in this suit, meaning the party who sued, was a dealer in second-hand cars and trucks. The defendant was a merchant who was in the market for a used truck. The dealer found this out and called on him several times to induce him to buy. The dealer offered one truck in particular which he represented as "good as new and in good working condition." There were several conferences, the last two being on the day before and on the very day the purchase was completed. At the conference on the night before, the dealer said in substance that the truck was all right, that he warranted it to be all right, and if the buyer, after buying it and trying it awhile, didn't find it satisfactory, he, the plaintiff, would take it back.

The merchant finally decided to buy and next morning went to the dealer's place of business to complete the purchase. At that time the dealer produced a judgment note covering the price of the truck and asked the buyer to sign it. The buyer did sign it, but before doing so, he said, "If this truck is not what you said it is, I am going to fetch it back." To which the dealer answered, "If it is not satisfactory, I will take it back."

The buyer thereupon signed the note and the truck was delivered to

him. It proved far from satisfactory as second-hand vehicles have a way of doing, but meanwhile the judgment note had been entered up. The dealer's promises to take the vehicle back weren't kept, and finally the buyer of the truck was compelled to get a lawyer and file a petition to open the judgment which had been entered up against him. The attorney for the seller of the truck interposed all manner of technical objections, but the lower court overruled him and decided that the judgment must be opened and the buyer's evidence heard as to the seller's warranties of the truck. The seller then appealed to the higher court, and the case was reheard there. The lower court's decision has now been sustained. The judgment is opened, and the case will be heard by a jury, to whom the buyer of the truck will be able to relate the seller's various warranties. The jury will then decide between them. The buyer has won a victory, understand, but look what it has cost him to win it! The loser pays the court costs, but each man pays his own attorney's fees, and the fees which the buyer of the truck has already had to pay out—and the case is really only at its threshold—will probably amount to at least \$250. He may win the case clean to the end, which means that he can send the truck back and won't have to pay his note, but all this will be accomplished at an expense of probably not less than \$300.

## As the Incident Should Have Happened

I can best show this by putting it in the form of a dialogue:—

Seller.—I've got a truck for sale that will just suit you. It's as good as new and in good working condition.

Buyer.—Please put that in writing.

Seller.—You won't risk a thing in buying this truck. If it isn't satisfactory, I'll take it back.

Buyer.—All right, put that in writing, too, and I'll buy.

Seller.—Why in writing? Don't you take my word?

Buyer.—Certainly, if it's in writing.



Here, I'll write something and you can sign it. (He writes this:—

I, the undersigned, warrant that I am the sole owner of \_\_\_\_\_ truck, engine No. \_\_\_\_\_, model \_\_\_\_\_, and that said truck, to the best of my knowledge and belief, is in good mechanical condition and in every way in serviceable running order. I make this warranty for the purpose of effecting the sale of the said truck.

Said truck must prove satisfactory to buyer or I agree to take it back.

Seller (after signing).—All right. Come down to my place to-morrow and we'll close the thing up.

Seller (the next morning).—Here's a judgment note I want you to sign, since you aren't going to pay cash.

Buyer.—But I don't want to sign a judgment note. You might indorse it over to somebody else and leave me high and dry. My credit's good. If this truck's what you say it is, I'm good for the price and you can make me pay it.

Seller.—It's customary to sign a note.

Buyer.—I'll sign an ordinary promissory note, not a judgment note, if you'll make it non-negotiable so it can't be indorsed to anybody else. Simply write on its face "payment subject to written agreement between maker and payee." Then if the truck doesn't pan out I won't have to pay it.

If the buyer had gotten the little warranty reproduced above, and had either refused to sign any note at all,

or signed only a non-negotiable promissory note, he would have been absolutely protected. When the truck fell down he could have acted on the written agreement to allow its rejection and sent it back, at the same time notifying the seller that he wouldn't pay the note. He would have saved his \$250 or \$300 and his time and worry over the law suit.

And yet look how extremely simple the protective measures are.

*Copyright, December, 1922, by Elton J. Buckley.*

The Newburgh Lime Mfg. Co., Newburgh, N. Y., has been incorporated with a capital of \$20,000. W. C. Martin, A. Lechman, M. Gorchoff.

Harris County, Texas, is seeking a bond issue of \$6,000,000 for highway construction in that county, and most important of the roads to be built out of the proceeds of this bond issue is the Galveston-Houston pike. Albert J. Wise, of the engineering firm of Howe & Wise, engineers to Harris County, has made surveys of the Harris county end of the Galveston pike and has submitted to the county commissioners estimates covering costs of various kinds of road construction. Mr. Wise recommends concrete construction, placing an estimate of \$45,000 a mile for an 18 foot roadway 6 inches thick at the curb and 8 inches thick at the crown.



This Company is Prepared for the Spring Rush

# Use of Churn Drill at Lime Quarries

By OLIVER BOWLES, Mineral Technologist U. S. Bureau of Mines

LIMESTONE for lime-burning is obtained chiefly from open-pit quarries situated on ledges of high-grade rock. In blasting down these rock ledges the disruptive force exerted should be somewhat less severe than in blasts at cement rock quarries, and yet more disruptive than at dimension-stone quarries. In blasting rock for Portland cement manufacture the purpose is to shatter the strata as much as possible, for the raw materials are all ground to a fine powder before burning. On the other hand blasting for dimension stone must be conducted with the greatest care as the massive blocks must not be shattered in any way. Blasting for lime manufacture falls in an intermediate position between these two extremes, for while the charges must be heavy enough to throw down great masses of shattered rock, the purpose is to obtain a large proportion of fragments more than 4 inches in size, and a minimum of fines. This is due to the fact that in burning lime in all ways, except in the rotary kiln, practically all materials under 4-inch must be excluded. In working out the spacing of drill holes and the nature and quantity of explosive this principle must be kept constantly in view.

Tripod drills are used in many localities, in drilling horizontal, inclined, or vertical holes for primary blasting. An air-driven rotary type gives good service especially for drilling holes in the quarry face. Hand-manipulated, compressed-air hammer drills are used to some extent for primary drilling, but chiefly for secondary drilling in preparing pop shots to break up the larger fragments. Of late years the churn drill, or well drill as it is commonly called, is used very widely for primary drilling in place of tripods.

While the hammer drill is more rapid in operation, more easily moved from point to point, and may be held with the hands without a tripod, even for holes 12 to 20 feet in depth, it is not generally employed for heavy blasting on account of the small size of the steel. The ordinary hammer drill employs 1½-inch steel in beginning a hole, while the tripod hole is 2¼ inches in diameter. As the depth occupied by 4 pounds of dynamite in the hammer drill hole would accommodate 9 pounds in the tripod hole, the latter is generally preferred. The opinion has been expressed by some quarrymen, however, that the speed of operation of the hammer drill more than compensates for the restricted size of the holes, and on this account the hammer drill is used for primary shots. Operators who have drilling and blasting records indicating the relative efficiency of the tripod and hammer drill would render a useful service to the lime industry by submitting the figures to the Bureau of Mines for analysis and general presentation.

Tripod holes may be drilled either from the top or from the face, the latter method being often employed where an irregular or seamy rock surface makes vertical drilling slow and costly. In some places drilling from the face is preferred even where there is no impediment to vertical drilling. Also horizontal holes at the base of the bench, known as "snake" holes may supplement the vertical holes where a heavy mass is to be removed, or where it is otherwise difficult to break the rock effectively at the quarry floor.

The churn drill, or well drill, as it is commonly called, has been used very widely in quarry work during re-



cent years. The mode of operation is so familiar to all quarrymen that a description is unnecessary. Recent modifications and improvements are described in the catalogues of the various manufacturers. Churn drills may be operated by steam, gasoline, compressed air or electricity. The latter is probably the most convenient and requires the least labor.

Heavy blasting in deep churn-drill holes is very commonly employed in limestone quarries, particularly where the product is used as crushed stone or for cement manufacture. The method is less widely used at lime-plant quarries, partly on account of unfavorable conditions, and partly because quarrymen are unfamiliar with the advantages or the method of operation of this type of equipment. Faulty blasting in churn-drill holes has also aroused prejudice on the part of many observers. A few years ago a churn drill was tried in a limestone where clay pockets were numerous and continued many feet below the surface. Unfortunately the drills either penetrated or came in close proximity to the clay pockets or cavities with the results that most of the force of an expensive charge was dissipated, and the rock ledge was scarcely shattered. Churn-drill blasting is now conducted very successfully in this same quarry by giving special attention to the avoidance of clay seams and pockets, but the one glaring example of failure and heavy loss has discouraged the employment of such drills in surrounding quarries.

In view of the wide use of other methods, and the difference of opinion that exists, it seems desirable to consider the advantages and disadvantages of the churn drill, and the conditions that govern its successful use.

An outstanding feature of churn-drill operations in deep quarries is the substitution of a single bench the full height of the face, for a series of

benches. The disadvantage of multiple bench quarrying that may be obviated by use of the churn drill may be enumerated as follows: (1) The danger to workmen of rock fragments falling from one bench to another; (2) the loss in productive capacity where men are watching for dangers from the bench above them; (3) loss of time and danger of accident where workmen climb ladders and move explosives and equipment from bench to bench; (4) undue complexity in transporting loaded rock from different levels.

Another undoubted advantage is the fact that churn-drill holes are as large at the bottom as at the top, while tripod or hammer drill holes diminish in size with increasing depth. Thus the small holes are usually sprung with dynamite to give space for the explosive, a tedious and somewhat dangerous operation, while churn drill holes ordinarily require no springing.

According to some authorities the drilling cost is lower for churn-drills than where the smaller drills are used, but opinions differ on this point. The purpose of drilling is to obtain space for the explosive, and consequently the only fair method of comparing costs is to consider drilling, not in terms of cost per foot but rather on the basis of the volume of space obtained. Churn-drill holes are usually about 6 inches in diameter. It is claimed that some of the improved hammer drills will project holes to a depth of 30 to 36 feet, and will maintain a diameter of 2 inches at the bottom. The volume of drill holes of various sizes varies as the square of the diameter, therefore a 6-inch churn drill hole of a given depth has 9 times the volume of a 2-inch hole of the same depth. Hence if no springing is employed it requires nine 2-inch holes to provide explosive space equal to that supplied by one 6-inch hole. For lower benches the tripod or hammer drill holes may

maintain a diameter of  $2\frac{1}{2}$  inches to the bottom, and about six such holes are equivalent to one churn drill hole. It is evident, therefore, that the small drill enters into more keen competition with the churn drill in the shallower holes, where there is little loss in diameter from top to bottom. The problem of relative cost, therefore, where springing is not employed resolves itself into the question, Is the total cost per foot, including repairs, overhead, interest on investment, etc., six times as great for churn-drills as for small drills that bottom with  $2\frac{1}{2}$ -inch diameter, or nine times as great as for small drills that bottom with 2-inch diameter? The advantage probably lies with the small drills for shallow benches, and with the churn drill for high benches. It would be very interesting to obtain cost figures indicating the height of face for which the drilling costs were equal for each type of machine.

If the practice of springing the small drill holes is followed, a comparison of efficiencies of large and small drill holes is more difficult. The cost of the time and explosive employed in chambering the holes must be added to the drilling cost, and the volume of the chamber obtained must be compared with the volume of the churn-drill hole in order to compare the methods properly.

There is considerable delay in all quarry operations when primary blasts are discharged. All quarry workers must remain at a safe distance and it may be found necessary to move some of the equipment. Blasting in churn-drill holes is usually on a large scale, a single blast at times supplying rock for several months operations. Therefore, there are smaller losses from delays incident to big-hole blasting than where more frequent blasts are discharged in the smaller drill holes.

It is claimed by some quarrymen

that heavy blasts in churn-drill holes break the rock very effectively, requiring little secondary blasting, while on the other hand advocates of small-hole blasting claim that the more general distribution of the explosive throughout the rock mass in small holes breaks the rock more completely, requiring less block hole shooting than where the churn-drill is used. These opposing views leave one somewhat in doubt. Undoubtedly different results are obtained in different types of rock. In either case the amount of secondary blasting depends largely on the quantity of the explosive used, and the arrangement of drill holes for the primary blast.

The churn-drill is most advantageous where the quarry face is 30 to 100 feet high, though it has been used successfully on benches of not more than 20 feet. As low benches require closer spacing of drill holes and lighter charges, the smaller types of drills are usually preferred.

In many limestone regions the rock is greatly dissected by erosion, leaving a very rugged surface over which it is difficult to move a churn drill, and where it must be mounted on a timber staging. Where this condition is pronounced it may be cheaper to drill from the face with tripods, rotators, or hammer drills.

Limestone beds, particularly in the Appalachian belt, may be tilted at steep angles, and the steeply inclined beds may be separated by open or clay-filled seams. When the drill bit meets such a slanting surface it may be diverted, forming a crooked hole in which tools may bind, thus causing great loss of time with possible loss of drill bit and abandonment of the hole. To overcome this difficulty pieces of rock, wood, or cast iron may be thrown into the hole so that the drill will pound on them for a considerable time. When the downward progress of the drill is thus retarded it enlarges the



hole, particularly by cutting away the rock that tends to divert it from its vertical course, and thus the hole is straightened. Another method of overcoming the difficulty is enlargement of the hole by exploding a stick of dynamite in it. It is claimed that with improved types of cutting tools, such as the "Gill" bit, little difficulty is encountered with inclined seams. If delays from this cause are excessive it may be preferable to drill from the face. An alternative method is to work out the rock in low inclined benches, utilizing the open seams for bench floors.

In some deposits the successive beds may vary in composition to such an extent that they must be applied to different uses. Thus in one Pennsylvania quarry the upper beds are used for fluxing and road stone, and the lower beds for the manufacture of pure chemical lime. It is obvious that such a quarry cannot be worked as a single bench, and thus is not adapted for churn-drills unless one or more of the separate benches is at least 20 or 25 feet in height. In this particular quarry the upper ledge is drilled from the surface with tripods, and the lower ledge is reduced by blasts in chambered snake holes.

According to Russell a single row of holes is probably best where the quarry face is 50 feet high or over. Where the face is 20 to 30 feet in height, 2 to 5 rows of holes may be shot at a time. Where two or more rows are shot at one time the alternate rows are usually staggered. The burden (distance of hole from face) and spacing (distance from hole to hole in the row) may vary considerably in different types of stone. It is probably better to begin with a close spacing and gradually increase it until the maximum spacing that will properly shatter the rock is attained. In an average limestone worked from a quarry with a 35 or 40 feet face the

spacing should be 10 to 12 feet and the burden 12 to 15 feet. Both spacing and burden should increase with increasing depth of holes, but should rarely exceed 20 to 25 feet for the deepest holes.

In approximately flat-lying beds an open bedding place may sometimes be utilized to form the quarry floor; and in such circumstances it is comparatively easy to blast out the rock to the base of the ledge. Where no open bedding seam exists or where the rock is steeply inclined and no joint is present that may be utilized for a floor seam, it is a more difficult matter to clear the rock at the toe. A common mistake in drilling is to drive the hole too short a distance below the quarry floor level. One blasting expert advises a depth of 5 feet below grade in solid limestone. Usually a certain amount of rubbish accumulates in the drill hole before it is loaded, and therefore it is better to drill too deep than too shallow.

In drilling either large or small holes it is of first importance to keep the drill in solid rock, and as far as possible to avoid drilling in close proximity to seams and pockets. If open seams occur in any definite system or exhibit any degree of regularity it may be wise to plot their direction and dip and thus determine the proper position for drill holes. Where irregular erosion cavities occur their positions may not be foreseen and drill holes may be lost by meeting cavities. If large open or clay-filled spaces are encountered, it is generally advisable to abandon the hole. Where the drill hole cuts a seam of moderate size the hole may be utilized if no explosive is placed close to the seam, the drill hole, from a point 3 or 4 feet below the seam to a point 3 or 4 feet above it being filled with stemming.

Ammonia dynamite is the most common explosive used in quarry work. Gelatin dynamite should be used in

wet holes. For lime-kiln operation, explosives with a high rate of detonation should not be generally used. The high-grade explosive tends to shatter the rock into small pieces that are not used in lime burning except in the rotary kiln. Dynamite of 30 to 40 per cent strength is most satisfactory. In seamy rock some operators advocate the use of black blasting powder which will penetrate the seams, and push out the rock masses with little shattering.

At many quarries a determination of the amount of explosive to be used for the entire charge or for each drill hole is a mere matter of judgment. Neither high blasting efficiency nor consistent improvement in blasting methods are to be expected unless the charge is regulated in accordance with the estimated tonnage of rock to be moved. The determination of tonnage is so simple that any blasting foremen with a common school education can work it out without difficulty. The tonnage for any particular drill hole is obtained by multiplying the burden in feet by the spacing in feet, by the depth in feet, thus obtaining the number of cubic feet of rock; multiplying this by the weight of a cubic foot of limestone, usually about 160 pounds, and dividing by 2,000. Thus if the burden is 15 feet, the spacing 12 and the depth 50, the number of short tons of rock to be moved by the explosive in each drill hole is

$$\frac{15 \times 12 \times 50 \times 160}{2000} = 720 \text{ tons.}$$

In determining the charge careful consideration must be given to the number of tons that should be broken by each pound of explosive. In average quarry practice, this varies from 3 to 6, for each pound of 40 per cent ammonia dynamite, depending on the toughness of the rock. The first charge may be estimated on an average basis, say 4 tons per pounds. Thus for the drill hole mentioned above 180 pounds

of dynamite would constitute a reasonable charge. When the blast is discharged the results will indicate how nearly correct the charge was estimated. If the rock is insufficiently broken the next charge may be calculated on the basis of  $3\frac{1}{2}$  tons per pound; if too greatly shattered it may be increased to 5 tons per pound.

Best results are obtained not only by varying the charge but in changing the spacing or burden of the drill holes. If the rock is very brittle and is pulverized close to the explosive charge, while insufficiently broken at a distance, it may be advisable to use smaller drills, and thus distribute small charges more generally throughout the rock mass.

Russell advises that where more than one row of holes is shot at one time, the back rows should contain at least 10 per cent more explosive than the front row. He also recommends a shorter burden for the back rows.

For hand loading the rock should be thrown out in a thin sheet, while for steam-shovel operation the fragments should be piled in a steep ridge adjacent to the quarry face. The charge should be adjusted to give the desired result. In quarries with low faces where several rows of holes are shot at one time to provide stone for steam-shovel loading, a method known as "buffer" or "blanket" shooting is sometimes employed. Part of the broken rock from the previous blast is left against the face to offer resistance or confinement to the charge and thus secure better fragmentation. It also prevents rock from flying over the quarry floor and damaging or burying tracks. The buffer method is not applicable to faces more than 50 feet in height.

An increase of \$15,000 is being made in the capitalization of the Tennessee Quarry Company, Knoxville, Tenn. The original charter called for a capitalization of \$10,000, and the amendment is for \$25,000.



# America Plans Greatest Building Period

**A**MERICAN building activity during 1923 will surpass all previous records with an estimated total expenditure of \$5,000,000,000 according to reports from architects, contractors and manufacturers of building materials.

It means that the 1922 volume will be exceeded by more than one billion dollars.

Tables prepared by The Architectural Forum from compilation of replies from 1,767 architects show that builders have carried their operations through the winter, maintaining an almost steady line from the heavy demand of the fall and winter months of 1922.

Dividing the total estimate in general groups it is seen that plans for schools, colleges and similar public structures lead the list with \$870,034,000. Apartments are next with \$662,885,000, and industrial buildings are third with \$548,037,000.

An interesting comparison is shown in the total for dwellings, which is \$414,132,000, almost as great as the total for offices and also for hotels.

Similar activity of vast proportions is planned by railroads. Actual budget figures for 31 road, controlling 40 per cent of all trackage in America call for the expenditure of \$387,000,000. Estimates by the Railway Age place the total cost of all rail improvement and construction at approximately \$900,000,000 during 1923.

Economic experts, studying the construction field, declare the basis for this unprecedented activity lies in the actual lengthening of the so-called "building season."

Building operations in 1922 reached unexpected heights during the summer and carried on through the fall and winter with little abatement. In many localities contractors completed

work which in other years would have been carried over and, in mid-winter, accepted new contracts for prompt delivery.

The result has been for heavier orders for steel, cement, trim and other building materials from the very start of the year 1923 than at any time in the history of the country.

Contractors, realizing the advantages of maintaining their forces of workmen intact from season to season, have carried work right along except in the extremely cold sections and have ordered additional material for immediate delivery which they will store until ready for use on new contracts.

The early peak load of demand on freight traffic is expected to feel relief from this steady movement and manufacturers also have been able to pass along the benefits of the longer season.

Advertisements for contractors in current periodicals specify that contracts will be taken for 60 and 90 day delivery of homes, a hitherto unheard of thing thus early in the year. This means that materials and labor are promptly available and that wherever possible the work will be pushed to completion.

The greatest difficulty faced by the building industry in America has been the problem of the short season. Twelve months of proposed activity were forced into seven months or less.

The salvation rested in a spreading out of the traffic demands of the materials industry and lines affiliated with the construction field over a longer season.

During 1922 the first effective demonstration of these claims was given to the public and with a record start, 1923 is expected to clinch the argument.

## Special Uses of Crushed Stone

A Paper Given Before the National Crushed Stone Association  
By JOHN J. SLOAN, Secretary, Wisconsin Granite Co., Chicago

THE numerous special uses of crushed stone do not in volume constitute any appreciable percentage of the total production as the markets for flux, ballast, macadam and concrete construction absorb 90 per cent of the quantity produced.

In addition to limestone being used for fertilizing purposes, you are familiar with its use in small granules of two distinct sizes: one for laying hens and the other for baby chicks; also its use in the various calf meals, where it is mixed in certain proportions with feed in order to afford the necessary lime for bone-building purposes.

You are also familiar with its use as an asphalt filler for pavement work when ground to 200 mesh;

Its use in the rubber industry as a filler when ground to 300 mesh;

Its use when meeting certain high calcium tests in the sugar industry and in the various carbide, alkali and other chemical processes.

Likewise the quantities that are used in the glass factories and paper mills;

As a filler in whiting and in paints;

As an addition to organic fertilizers.

Where it has certain distinct colors it is used in small, carefully screened sizes for stucco and terrazzo work.

There has been a heavy demand for the heavily stained, weather-worn, thin slabs of limestone in building and wall construction in various sections of the country and many pretty artistic effects are being produced with them.

In harbor construction and shore protection large quantities of crusher run limestone up to 6 in. is used in many places to build great cores that come within a few feet of the surface of the water, and then along the

slopes of these cores as well as their top is placed 5-ton pieces of granite or other hard rocks that will resist storm, ice and erosion.

Last but not least large quantities are burned into lime which in turn forms the base for materials produced with it that are used in a thousand lines of industry that range from steel to soap.

In the granitic or siliceous rocks those that are highly colored have when crushed and carefully screened to small sizes a limited market for stucco terrazzo and dash work.

Within the past year two plants have been erected in this country that I know of for the manufacture by fusion of various-colored siliceous stones, which is then crushed and screened to sizes for pebble-dash stucco, and terrazzo work. The colors on test have proven quite satisfactory and they are able to produce at will any shade called for. On account of the greater uniformity of color and wearing qualities this material, if found on extensive tests to hold its color, will prove a serious competitor to the stone men in this line, and I would advise against any extensions in the production of this class of material until the future of this artificial products is determined.

The finely pulverized material when tube-milled can be used as a filler in mastic floors.

For septic tank systems and sewage disposal basins, hard aggregates ranging in size from 8 down to  $\frac{1}{2}$  in. have an increasing use, and with the growth of population in the country, and the efforts being made to prevent the fouling of our streams, this method of sanitary disposition is constantly increasing.

Granite and quartzite blocks are be-



ing supplied these days for tube-mill linings. The same material is being used in lieu of pebbles not only in cement but in many mining centers where the flotation process for the recovery of ores is now used, necessitating fine grinding and the use of material that is inert, and which would not form any chemical combinations in opposition to that used in the treatment of ores.

Sandstone, containing a certain percentage of clay and aluminum, making it practically a natural silicate of aluminum, is used in the form of blocks for lining blast furnaces and other places in the metallurgical trades, where its ability to withstand a temperature of 3,600 deg. F. and upward, renders it superior and much more economical than a high-grade fire-brick.

Quartzite and granite screenings are likewise used in the steel mills for the lining of kettles, constant repairs, and replacements to silica brick linings, which is likewise a product of silica rocks, of upward of 96 per cent content.

In the oil fields, heavy asphaltic oils are now treated through towers lined with an extremely hard resistant rock ranging practically 80 per cent in silica, and in various other systems of treatment for filtering the crude oils before the cracking or distillation process begins.

Similar granitic rocks are used for curbing, flagging, and paving blocks of various sizes and shapes.

In crushed rock it is used as a wearing surface to armor-plate countless miles of road annually, either in cement or bituminous concrete form.

The bulk of crushed granite is produced as a waste material incident to the cutting of stone for buildings, monuments, paving blocks, etc. In addition to paving, it finds its market for curb and gutter, sidewalks, surfacing, and scores of places where se-

vere stresses must be met and hard wear withstood. Sulphuric acid towers, acid-resistant floors, various chemical apparatus, harbor improvements, rubble-mound breakwaters, rip-rapping and shore protection on the oceans, Gulf and Great Lakes shores, as well as river protection in fast-flowing streams—all consume quantities of hard rock which must withstand the stress of storm and be proof against constant freezing and thawing.

From 10- to 15-ton units down to material to a 300 mesh—which latter is also used in the roofing trades—as well as in soap and cleansing compounds, there are places being constantly developed for the use of all sizes between.

Of course the volume is small as compared with the ordinary uses, but in a growing country like ours, with marked initiative toward improvement and bettering existing methods of carrying on our various industries, there is a promise that as the days go by the market will be extended.

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One hundred and twelve carloads of cement have been imported from Belgium into California within the last seven months.

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The sum of \$70,000 is being spent in enlarging the rock crushing plant of Dudley & Orr of El Paso, Texas. A large contract has been obtained from the Texas & Pacific Railroad Company which calls for 270,000 yards of ballast. This represents approximately \$270,000.

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The offices of Sauerman Bros., of Chicago, Ill., have been moved from the Monadnock Block which has housed them for seventeen years, to 438 S. Clinton St., five blocks west of the old location. The shop, warehouse and assembly room have been located for some time at the new address and the additional space which they have now acquired enables them to consolidate all departments of their business under one roof, which will considerably improve their facilities for serving customers.

## Large Granite Crushing Operation

The operation of the Weston & Brooker Company at Gayce, S. C., near Columbia, is possibly one of the largest crushed granite operations in the country. The operation is unique in many respects, in the location and territory served, in the peculiar qualities of the granite and in the methods employed in production.

The quarries are on the Seaboard Railway with Southern and Coast Line connection. Railway location, together with its proximity to the coast, permits the delivery of its product over a large territory, the normal territory for the output being included within the triangle from Columbia to Wilmington, N. C. and from Columbia to Jacksonville, Fla., covering as well the area to the West for 50 to 70 miles.

During periods when competing plants to the West and North cannot supply the demand, or when specifications require particularly high wearing qualities, the product invades this outside territory, having been shipped as far West as Asheville and as far North as Richmond.

It would hardly be possible to produce and market successfully this hard and tough, hence expensive granite, if it were not for the advantageous railway facilities and the large territory to the East and South practically free from serious competition with cheaper crushed stone. Of course, gravel offers cheap competition, but the demand for a material with high toughness and French co-efficient in paving, and superior qualities in reinforced concrete, provides a ready market.

Geologically classed it is a biotite granite of great toughness and elasticity. The French co-efficient runs around 16 to 17. It offers great resistance to drilling and crushing; for example, well drills fitted with extra heavy tools and special bits cannot average more than 1 foot per hour of 6 inch hole, and the crushers require special construction throughout and manganese fittings.

Unlike many granites, this granite does not readily split, and cannot be successfully worked for dimension stock. It breaks into comparatively compact pieces with rough fractured planes at approximately 60 degrees to each other. This quality makes it

peculiarly adaptable for use as crushed granite.

Chemically the granite is 72 per cent silica, 14 per cent alumina, with a little lime, potash, soda, etc., but there are practically no flakes or streaks of mica. The specific gravity runs around 2.66, therefore the weight per cubic foot solid is 166 pounds. The granite is particularly live and beautiful in its endless shades of colors. There are all shades of pink from the darkest to the lightest, and likewise all shades of blue from light-grey blue through sky blue to the darkest. There seems to be no line of cleavage separating the various colors, but they are shot in great blocks in the solid ledges.

The quarry is a pit operation. It is located on a 40 acre flat area along the west bank of the Congaree River, the average elevation of the land being 35 feet above the normal water level. It is interesting to note that the floor of the quarry is about 160 feet below the bed of the river and something like 100 feet below sea level. The granite lies in a solid ledge under 12 or 15 feet of overburden.

The crushing plant is located on a down grade spur 1,500 feet from the Columbia-Savannah line of the Seaboard. The quarries, roughly described, radiate fan-like from the crushing plant, being 700 to 800 feet open pit. The southwestern area of the quarry has a double face 800 feet long, and is being operated to a depth of more than 200 feet. The northeastern area is 700 feet long with a 100 foot face on one side and a 40 foot face on the other.

Each of these quarries is served by a radial traveling cableway with tail towers back of the primary crusher. The No. 1 cableway has a span of 865 feet and is about 75 feet above the surface level. The tail tower is wood A-frame construction. The head tower is steel mounted on two standard gauge tracks 34 feet apart. The head tower is counterweighed with two cribs loaded with riprap.

The main cable is 2¼ inches in diameter of patented smooth lock wire construction and furnished by A. Leschens & Sons Rope Company of St. Louis. The anchorage is carried by two 2¼ in. galvanized guy ropes





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Cableways operating in  
the quarry of the  
Weston & Brooker  
Company at Columbia,  
S. C.

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*Plymouth Gasoline Locomotive at Gibsonburg (Ohio)*

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The PLYMOUTH Locomotive is the most persistent "Repeater" of any haulage unit on the market.

The initial sale quite frequently inspires the one—two—three and even four succession.

**PLYM**  
*Gasoline*





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**OUTH**  
*ocomotives*



Skips of Both Cableways at Crusher Dump



Traveling Tower of No. 2 Cableway at Weston & Brooker Quarry



back 300 feet from the tail tower to concrete anchors fitted with U-bolts and pins fastenings.

The engine is a Lambert, furnished by Lambert Hoisting Engine Company, Newark, N. J., a cableway engine with conveying drum and combined hoisting and dumping drum. The engine is driven by a 90 H.P. variable speed General Electric motor through a flexible coupling through herringbone gears furnished by Fawcuss Machine Company, Pittsburgh, Pa., for speed reduction. The ropes lead upward about 80 feet to the top of the tower to the directing sheaves.

The radial motion of the tower is secured by a reversible motor worm-driven drum pulling in either direction through steel rope to ground anchorage. The entire control is under the direction of one engineer whose cab is adjacent to the engine.

The No. 2 radial traveling cableway in some features is a radical departure from other methods heretofore in operation. The traveling tower or car is simply a steel and concrete constructed car carrying ballast in each end and the engine in the middle. The tracks carrying the car are 8 feet 6 inches gauge, and the track is elevated on the inside rail about 15 inches, thus throwing the center of gravity low and well back to the outside rail.

The engine is of special design using Lambert drums. Each drum is driven by a 75 H.P. variable speed General Electric motor directly connected through a flexible clutch to pinion shaft reducing speed to each drum through Fawcuss herringbone gears. No frictions are necessary with this system and the control is handled through the motors and breaks.

The radial motion of the tower or car is secured by a directly connected 20 H.P. motor driving a Fawcuss worm gear which drives one pair of wheels. Its motion is thus limited only by track length.

The main cable is a 2 inch long lay Leshens cable and is secured near the base of the tower by a bridle swung from each end of the tower to the main cable 70 feet away. The lines leave the drums and pass under or over the main cable through a master spacer about 80 feet from the engine. Both cableways are rigged with Lambert system carriages and spacer of special design, Roebling and Leshens

rope being used throughout the entire operation.

Compressed air for the operation is made by an electric belt-driven Ingersoll-Rand compressor of 1,200 cubic foot capacity. The air is piped to all parts of the operation, and operates the well drills for blasting, also operating Ingersoll-Rand jackhammers for pop shooting and Ingersoll-Rand tripod drills for ledge blasting holes.

Compressed air is used not only in the drilling operations, but drives air tools for repair work, forges, Leyner drill sharpener, derrick engine for handling machinery at crushing plant and furnace for dryer in fine screening system. The operation is completely electrified using hydro-electric generated power from the plants of the Columbia Railway Electric Co. using motors or motor generated compressed air for the operation of all machinery.

Well drill blasts are prepared with 6 inch holes from 110 to 140 feet deep in double row. The holes near the face are placed 22 feet back and 22 feet apart, the second row is 15 feet back and 22 feet apart, staggered with the front row.

The blasts are loaded with 60 per cent nitro-glycerine DuPont dynamite. The holes are loaded to within about 50 feet of the surface and tamped to the surface with screenings. Small charges are placed at intervals through the tamping.

The shot is electrically wired as well as primed with Cordeau-Bickford fuse, thus rendering complete and instantaneous firing doubly certain. Such blasts shoot down from 40,000 to 70,000 tons.

The pop drilling is done with Ingersoll-Rand jackhammers and loaded with 60 per cent nitro-glycerine dynamite and fired with time fuses.

Steel skips of 6½ ton capacity are placed along the face of the muck pile, and loaded by hand. Loading labor is paid by the ton. The skips sit flat on the floor of the quarry with open end toward the muck pile and are practically loaded by barring and rolling the granite into them. The use of steam shovels has never been deemed practical or advisable and it is doubtful whether they could be operated and maintained as cheaply as the hand loading methods used.

The cableways work the skips in rotation, hoisting and conveying in

one operation to the primary crusher, and are dumped by the operator without placing or unlocking.

The combined capacity of the cableway is around 250 skips in a nine hour day, making the total daily average readily obtainable of 1000 to 1500 tons.

The crushing plant is equipped with a No. 27 primary gyratory crusher of 300 ton per hour capacity furnished by Kennedy-Van Saun Mfg. and Engineering Company, New York, with No. 8 and No. 5 Kennedy gyratory crusher for secondary work. These three crushers are belt driven from a direct motor-driven jack shaft. The whole system is housed in concrete and provided with fan system to remove dust.

The fourth crusher takes the rejections from the primary breaker from a specially constructed bucket elevator and rejects to the No. 8 Kennedy.

This fourth crusher immediately follows the primary breaker and is a Weston direct-drive gyratory crusher, manufactured by Morgan Engineering Company, Alliance, Ohio. This machine is a new arrival in the crusher world and judging from results obtained here is calculated to set some new records for secondary crushing.

A 30 inch Goodrich belt and bucket elevator takes the rejections from the secondary crushers to a 60 inch by 24 foot Austin screen above the bins where it is sized and distributed. The Austin screen is jacketed for 16 feet with an 84 inch jacket with  $\frac{3}{4}$  inch perforation. The  $\frac{3}{4}$  inch material is carried by a short belt conveyor to a combined drier and screen where the dust and sand are screened out. The  $\frac{3}{4}$  inch product and sand are marketed but the dust is collected by water spray suction system and wasted.

There are three loading tracks, the main track passing directly under the bins, one on the back for side loading and the third track between the crushing plant and the quarries for riprap and jetty loading. Track capacity for loaded cars of crushed stone without a switch is 15 cars. Shifting for car loading is done by motor-driven pulling engines located at the end of the loading tracks.

The operation employs normally about 110 men, about 90 of whom are negro laborers and 20 white persons, the latter principally the office force,

foremen, engineers and mechanics. The normal operating day is 9 hours and the normal operating week is 5½ days. Experience has shown that the closing down of the plant at noon on Saturday facilitates repair work over the week-end, and therefore does not reduce the output.

Practically all employees are paid on the hour basis except the office force and the skip loaders who are paid by the ton. The time clock system is used for all outside employees. All employees on the job are paid a bonus based on the tonnage produced each week. As a basis of fixing this bonus all employees are classified into three classes: No. 1 class includes foremen, engineers, etc., and their bonus rate is 12 cents per hundred tons. No. 2 class includes skip loaders, drillers and other semi-skilled workers, and their bonus is 6 cents per hundred tons. No. 3 class includes all common laborers and their bonus is 3 cents per hundred tons. In order, however, for any employee to be entitled to receive a bonus of the week's production he must have lost no time during the pay-roll week.

Although the bonus paid under this system amounts to about 5 to 7 per cent of the pay roll, it is the opinion of the management that it is a good business proposition. It stimulates the interest of every employee, from the lowest to the highest, in keeping up the tonnage. It likewise stimulates all employees to make full time and be prompt in coming to work.

It may also be of interest to describe briefly the methods used by the company in handling accidents. For several years the company has not carried any liability insurance, and is licensed by the insurance department of the State of South Carolina to carry its own insurance under a system of its own. By bulletins posted at various places of the operation and by information to the employees through other channels all employees are notified of the conditions under which they work while in the service of the company. They are required to sign no agreement or releases or to pay no fees in order to secure the benefits of the accident insurance service.

The cost of operating this insurance service has not exceeded the cost of the premiums on liability insurance, and even if the cost were much greater it would be good business be-





Traveler for Cableway No. 1

cause the effect on the morale of the employees is worth the price. Of course, there is always a possibility of failure in settling a case by this method and the filing of damage suits, but the method has been in operation so successfully for a number of years that all employees would testify in the interest of the company in any such suit.

### Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,442,227. Process and apparatus for removing foreign matter from gravel. Endre A. Lansrud, Des Moines, Iowa.

1,442,911. Tripping device for scoops or conveyors. Charles A. Steward, Plano, Ill.

1,442,939. Loading-machine. Robert P. Greenleaf, Cleveland, Ohio.

1,443,128. Rock-drill. Charles C. Hansen, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,443,181. Hopper for gravel-screen plants. Francis J. Hill, Sr., Philadelphia, Pa., assignor to Curtis & Hill Gravel and Sand Co., same place.

1,443,344. Cutter-head for coal-drills. Charles T. Chapman, Terre Haute, Ind.

1,443,344. Rope-thrusting shovel. Walter Ferris, Milwaukee, Wis., assignor to Bucyrus Co., South Milwaukee, Wis.

1,443,354. Boom and bucket. Charles E. Foote, Nunda, N. Y., assignor to Foote Co., same place.

1,443,757. Crusher. Harold M. Plaisted, St. Louis, Mo., assignor to

Williams Patent Crusher & Pulverizer Co., same place.

1,443,586. Sand-cutting machine. Albert Nelson, Chicago, and Louis R. Wonderling, Maywood, Ill.

1,443,772. Sand-cutting machine. Howard L. Wadsworth, Cleveland, Ohio.

1,443,773. Sand-cutting machine. Howard L. Wadsworth, Cleveland, Ohio.

1,444,195. Process of screening coal. Raymond G. Lawry, Chicago, Ill., assignor to Roberts & Schaefer Co., same place.

1,444,221. Adjustable head for disk crushing machines. Edgar B. Symons, Evanston, Ill., assignor to Symons Brothers Co., same place.

1,444,670. Power shovel. James P. Dovel, Birmingham, Ala.

1,444,760. Dipper. Arthur Whitcraft, Bucyrus, Ohio.

1,444,800. Grab-bucket. George E. Mellin, Westerleigh, N. Y., assignor to C. C. Hunt Co., New York, N. Y.

# Valuation of Stone Deposits

A Paper Given Before the National Crushed Stone Association

By JOEL H. WATKINS

Mining Geologist, Charlotte C. H., Va.

IN its relation to capitalization and development, the valuation of a stone deposit is, if anything, fundamental. Strange to say, however, it would seem to be about the last thing thought of by some of our friends of the stone-crushing industry. No doubt, many of the stone-crushing enterprises of this country have been the outgrowth of local and intermittent demand, and have been started in a small way. Stone deposits of any magnitude are, generally speaking, more or less visible at the surface. For an initial output, therefore, of limited tonnage, the erection of a small crushing unit has in most cases probably been justifiable. Many of these initial plants have been enlarged from time to time until their capacities have been greatly expanded.

The rapid growth of our towns and cities, the thousands of miles of railroad ballast, and the ever-increasing demand for crushed stone for highway and general concrete construction have all helped to bring the stone-crushing industry to the front as a sound and permanent business. A large number of these stone deposits are well located with regard to market conditions and have valuable tonnage reserves.

## Find Out What Deposits Are Worth

To some of us at least it would seem that the time has now come when an inventory, so to speak, of such deposits should be taken and a present value placed on their stone reserves. Such a valuation should in most cases be based upon geological investigations, accompanied by detailed geological maps and sections, so as to illustrate thoroughly the extent and character of the deposit under con-

sideration. As compared with metalliferous ore deposits, the geology of stone deposits is comparatively simple. With perhaps few exceptions, all of the stone produced by the crushed-stone industry is won by open quarry methods.

In general, stone deposits may occur as massive bodies without strike, dip, or bedding planes, as in the case of unaltered granites, diabase (trap rock), and other rocks of igneous origin; they may be flat lying with distinct bedding planes of measurable thickness, as in the case of limestone, sandstones, and other sedimentary rocks; or they may be folded and distorted until the workable beds are pitching at almost any angle from the horizontal, as in the case of both metamorphic rocks and unaltered sedimentary rocks. These are but elementary and simple facts to the geologist, but to the layman, the quarry owner, they seem to impart some mystery of dubious import.

Some quarrymen, through constant observation of their own stone deposit, become convinced that they, better than anyone else, can interpret its geological significance. They will speak knowingly of such much-abused terms as strata formations, and upheavals, and at the same time fail to observe some of the most obvious facts written in the rocks. Please bear in mind that when I speak of geologists, I refer only to men who are thoroughly trained in their profession, who have had wide and varied experience, whose judgment is sound and mature, and who are honest in their opinions.

In America, the profession is well supplied with men of this type, but unfortunately quarry owners do not,



as a rule, come in contact with such men often enough to appreciate their worth. I am afraid that it is too often the case that when executives of the stone-crushing industry make up their minds that they need the services of a geologist, they cast about and finally engage the services of an incompetent man who does not possess the knowledge and experience so necessary in imparting to the owners the information which they desire and deserve.

I would therefore base the valuation of stone deposits on the following considerations in the order of their importance as I see them at this time:\*

#### Quantity

Crushed stone is classed as a low grade commodity—that is to say, the margin of profit per ton is usually small. As a dividend producer, therefore, a crushed stone proposition is only attractive when its daily production is large and the stone reserve is adequate. Take, for example, a crushed-stone plant of modern design and equipment, and say of 1000 tons daily capacity. Capitalization of such an enterprise should be based on not less than 25 years' stone reserve which would be depleted under the continuous operation of the plant at capacity. Amortization should be at such a rate as would insure a return of the initial investment in not more than 15 years. Should the plant capacity be 2,000 tons daily, for the same body of stone, valuation should be in proportion to the increased capacity and earning power, and amortization in proportion to the shorter life of the quarry. In considering the value of a stone deposit, therefore, the quantity of stone in sight is obviously of first importance.

In order that the available tonnage of stone within a given area be meas-

ured with a reasonable degree of accuracy, the deposit should be visible on at least four sides, or there must be abundant geological evidence as to the extent of the deposit, upon which dependable estimates may be based.

One of the first things that a valuation engineer wants to see when he approaches the task of preparing a report on a stone-quarry property is a drawing or blue print, showing accurately the boundary lines of the property which is to be studied. Such a map should not only show property lines, but should show all buildings, roads, streams and rail tracks, and also a topographic sketch with contour intervals of not less than 5 ft. The preparation of such a base map is plainly the work of a civil engineer, and should not be expected of a geologist. My own observation has been, however, that few of the stone quarry companies have really good base maps, and almost none of them have topographic maps. To attempt to prepare valuation reports without base maps is placing a handicap on this work which is an injustice to the valuation engineer, and detracts much from the usefulness of his investigations.

In measuring a stone deposit, therefore, it is desirable to have good base maps, upon which, and with the aid of geological sections, both the lateral and vertical extent of the deposit can be shown. Such measurements must take into consideration both the thickness and character of the overburden, the depth to which it is at present practicable to quarry, the varying elevations of the surface overlying the area of workable stone, the thickness and dip of workable beds, should they be overlain or underlain with undesirable materials, and the depth to which it may be practicable to work the deposit at some future time.

#### Characteristics of Rock Deposits

Some simple features may be mentioned here which have a geological

\*In arranging the order of these considerations, I was aided by suggestions from my friend Charles Catlett of Staunton, Va.

meaning, and which also have a bearing on the quantity and availability of stone deposits. As has been stated, some stone deposits are massive in form and show no bedding plans or lines of rock cleavage. All rocks, however, and especially igneous rocks, are divided into large and small blocks by systems of cracks and crevices known as joints. Jointing is usually highly developed in basaltic rocks, commonly known to quarrymen as trap rock.

These systems of joint planes which cut the rocks at various angles are in almost every case a help to the crushed-stone quarryman in breaking down the stone, but in many cases they are a hindrance to the dimension stone quarryman in getting out blocks of marketable size. Where the stone is massive, the overburden, which must be moved before hard fresh stone can be reached, is almost invariably residual clay, or some weathered or semi-decayed rock, unless the overburden happens to be an alluvial or glacial deposit, which is transported materials, and not derived in any way from underlying rocks.

On the other hand, limestones, as a rule, do not decay or disintegrate, unless they are very impure limestones, and carry a large amount of clay substance. Limestones are simply dissolved by the weak acids carried in solution by surface waters, and leave behind a mantle of residual clay which represents the iron-aluminum-silicate content of the original rock. Under ordinary conditions, erosion carries off much of the residual formed in this way. Limestone deposits, which are subject to erosion, therefore, generally have but a light mantle of clay. This is particularly the case in the colder climates, where erosion usually keeps pace with rock weathering.

Every quarryman who works in limestone, however, is familiar with pot holes, mud seams, and sink holes,

which often carry the stiff red clay deep into the face of the quarry. I have seen limestone deposits being worked which showed almost no residual clay, but which were covered with a mantle of alluvial clay from 20 to 50 ft. in thickness, as in the case of the limestone deposits along the Mississippi river north of Alton, Ill. Again I have seen limestone beds which were barely exposed in a few places at the surface, and still the workable stone began but a few inches below the grass roots, as in the vicinity of Bellefont, Center County, Pennsylvania.

#### Mining of Limestones Will Increase

Where the limestone is being used for lime burning, as furnace flux, and in the manufacture of portland cement, there are a few locations where the stone is won by underground mining methods. Though such cases are limited in number at the present time, my prediction is, that as time goes on, the number of underground operations of this class will increase from year to year, due to the fact that some of our most valuable deposits which are close to large and permanent markets, are being steadily depleted of stone, available at or near the surface. There are cases which have come under my observation where the use of a drill has been found to be quite necessary, in order to determine the extent and character of the stone where it has not been exposed by nature or by present quarry developments. Such exploration work may be accomplished with use of either core drill or churn drill, but the core drill is generally considered more desirable, as the core taken out, foot by foot, affords a better means of both physical and chemical examination of the rock than does the pulp from a churn drill.

In order to determine the quantity of stone within a given area, which will be available under different con-



ditions of operation, as many measurements should be taken, both laterally and vertically, as practicable. Use should also be made of all geological data which is evident, and which has a definite bearing upon the extent of the deposit. When such information is carefully plotted upon geological maps and sections of good scale, they afford the quarry owner and the banker a graphic illustration of the stone reserve and of the physical conditions of operating which they can comprehend in no other way.

### Quality

The physical and chemical properties of stone which determine its quality are as important, in a way, as quantity. For example, there are many localities where large deposits of stone occur close to market, but which are of no commercial value on account of being unsuited for any of the ordinary uses of crushed stone. In the Appalachian states, one of the predominating rock types of the crystalline area is mica schist. This rock, especially where it is high in mica content and breaks into flat lense-shaped fragments, is unsuited for either road metal, railroad ballast, or concrete construction. Some rocks are hard when freshly broken, but disintegrate quickly upon exposure to the atmosphere. Some limestones are impure, soft, and shaley, and are undesirable for almost any use.

I feel that this discussion should have to do chiefly with crushed stone for construction purposes, though I realize that many lime, cement, and fluxing stone companies also sell crushed stone in large quantities. The chemical composition of rocks, which may be used as crushed stone, effects their value only in-so-far as their physical properties are concerned. The hardness of the stone and the manner in which it breaks has much to do with its ease of production and its desirability.

For example, quartzite and diabase, two of our hardest rock types, generally break into sharp, angular fragments, and are admirably suited for railroad ballast and concrete construction. On the other hand, the cost of drilling and crushing these two types is so much in excess of the same cost items in other types or rock that they necessarily demand a higher selling price in order to show a reasonable margin of profit.

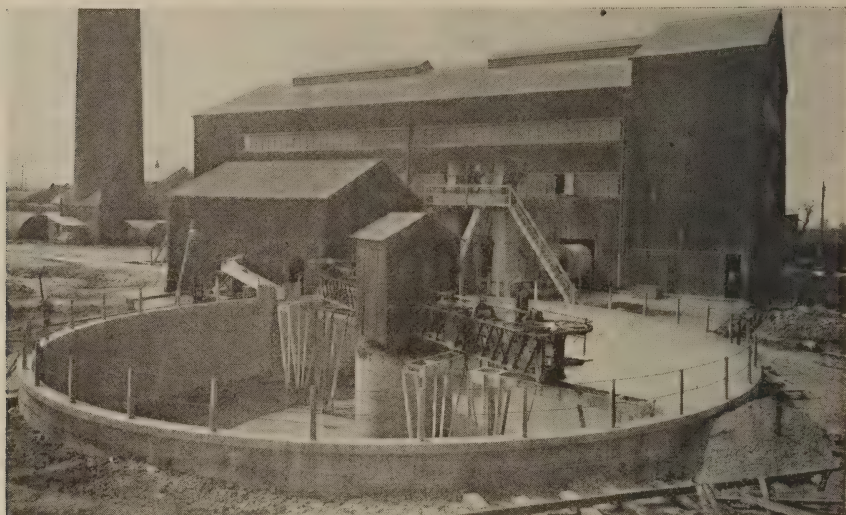
### Lack of Geological Information

There are throughout this country today, and probably in every state in the East, monumental examples of failures due to physical and chemical properties of stone, which were not judiciously taken into consideration before work was begun. I know of one example wherein one of our trunk line railroads, needing ballast in one of the states traversed by its lines, first opened two large quarries, both in mica schist. This rock was fairly easy to drill and crush, but unfortunately it broke into lense-shaped fragments, all of which were coated with fine scales of mica.

These quarries were operated for a period of years, and a considerable mileage of the railroad was ballasted with this material. Though it seemed to take a long time to soak in, those in authority finally came to the realization that the mica on these lenses of rock was acting as a lubricant, and though wedged in tightly by constant tamping of the section men, the ballast had no binding properties and would soon work out of place.

A quartzite quarry was next opened, but due to the hardness of the stone this quarry failed after a period of expensive operation, when the discovery was made that good stone could be purchased nearby for less than it was costing to produce the quartzite. Their next venture was to give a large contract for ballast, and

(Continued on page 106)



Discharge Side of Raw Material Grinding Plant

## English Cement Plant

The Ship Canal Portland Cement Manufacturers Limited have completed their plant at Ellesmere Port, on the Mersey River near Liverpool, England, where they produce their famous England brand Portland cement, and Pit and Quarry is fortunate in being able to show this plant to its readers, both descriptively and pictorially.

The raw materials from which England Portland cement is produced are limestone and shale derived from the company's own quarries. In these properties the company possesses raw materials of such excellent quality and regularity in chemical composition as to insure, with, of course, adequate care in the process of manufacture, the production of cement of unsurpassable quality.

The works are situated on a unique site of about sixty acres, with frontages to the Manchester Ship Canal, Shropshire Union Inland Canal, and direct railway connections with the London & North Western and Great Western Railways, which site was chosen expressly for the purpose of cutting out transit delays, so as to serve expeditiously all its natural markets—home, coastwise, and abroad, by rail, road, inland canal, and by direct shipment to all parts

of the world from its own deep water wharf at the works.

The company is in no fear of running short of raw materials for the production of cement, as in their quarries in North Wales they have inexhaustible supplies, not only for the present capacity of the works but also for practically unlimited extensions thereof.

It is interesting to know that from their Little Orme limestone quarries, in addition to shipping limestone—one of the raw materials for the manufacture of their cement—to their works, they also supply this limestone for blast furnace and chemical uses. This is due to the remarkable purity of the material, which is, speaking commercially, pure carbonate of lime.

From this limestone the company prepares and markets a commodity in the form of an extremely fine powder under the trade name of "Carbo-Limo" for all agricultural and many other purposes.

The actual work of the factory commences at Stanlow Wharf—the work's private wharf on their estate—a fine structure substantially built, which presents a frontage of about 1,000 feet to the Ship Canal.

The works site was chosen because



of its ideal situation for transit facilities. It stands alone for the opportunities it enjoys for direct foreign shipment. Ocean liners of a capacity up to the maximum that can navigate the Ship Canal—say 20,000 tons burden—can be dealt with at the works wharf, where there is a minimum depth of 28 feet of water at all times.

The wharf is equipped with electric and steam cranes for rapid despatch of all tonnage, the company performing loading and stowing services at record speed.

To this wharf is brought the limestone in coasting vessels of various sizes, and as work is carried on day and night there is no delay in discharging. In fact the keynote of work throughout the whole factory may be said to be "despatch." Steam and electrically-driven cranes equipped with special grabs quickly discharge the steamer, the limestone being carried to the storage bins by a series of Robins belt conveyors running under the wharf to elevators serving belt conveyor systems running over the wharf storage bins. These bins have a storage capacity upwards of 12,000 tons. From the wharf storage bins facilities are provided for the conveyance of the stone to the factory or if required, into the company's or other railway wagons or barges alongside the wharf. The bulk of the consignments from the quarry are, of course, used in the factory itself.

Before leaving the



Sacking Department and Cooperage Shop

quarry the stone required for the manufacture of cement is broken to  $1\frac{1}{4}$  inch and down, and for carbo limo to approximately 6 inch pieces. The larger stone discharge is conveyed under the wharf and elevated to the crushing department adjacent to the wharf and is broken by means of a jaw crusher to 3 in. and then passed through Jeffrey mills to be pulverized to  $1\frac{1}{4}$  in. and down ready for the factory.

The stone when required in the factory is extracted from the bins through shoots in tunnels beneath the bins, the gravity system adopted being most ingenious but simple and effective. Through the shoots the stone runs into cube-yard wagons and is drawn by a 2-foot gauge locomotive to the factory.

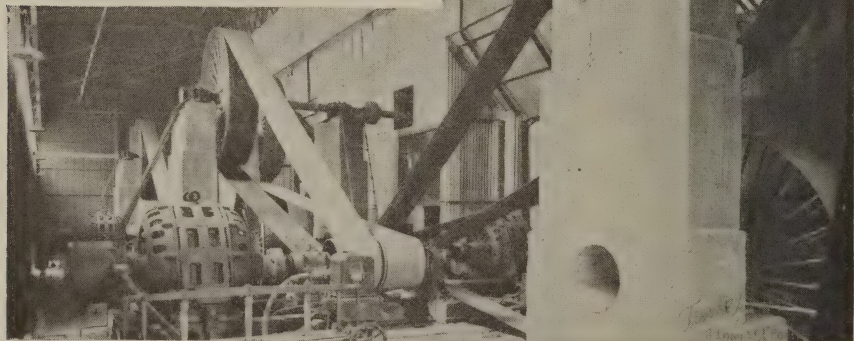
Efficiency as a keynote at the cement works is carried right through every operation, and the method of unloading the railway wagons is well worth mention. Part of the raw material arrives by rail in addition to the water-borne traffic previously mentioned.

Special railway trucks are employed to bring the shale from the quarry and the cement company's special train is known locally as the "Ellesmere Port Express." The 15-ton wagons are hopped and provided with bottom doors mechanically operated, and as each truck is in turn halted over an underground hopper the bottom doors are released and the mass of shale falls by gravity into a bucket elevator.

The shale, on being discharged from the wagons, is elevated and carried on belt conveyors to three huge reinforced concrete silos. There are in all seven of these silos, the other four being reserved for the limestone. From these storage silos are drawn the limestone and the shale in the required proportions (determined by measurement), and the resultant mixture of stone is carried by the inevitable belt conveyor to the elevator, which by this time has become a familiar sight, by means of which it is again raised and passed into steel bins from which the grinding mills are supplied.

The stone is fed to ball mills and water is added. When the product which is now a fluid leaves the mills it is conveyed by elevators to F. L. Smidth & Co.'s trix machines.

These machines separate the product, the fine material passing to the



Raw Material Grinding Plant—Power Station Above



distributors to be fed to the tube mills, the coarse particles being returned to the ball mills for further grinding.

When this material finally leaves these tube mills it is known as "slurry" and is carried by means of troughs to the slurry tanks. These are circular tanks constructed of reinforced concrete, 66 feet diameter by 13 feet deep. A most ingenious mixing plant, fixed on a center base keeps the mixture in motion.

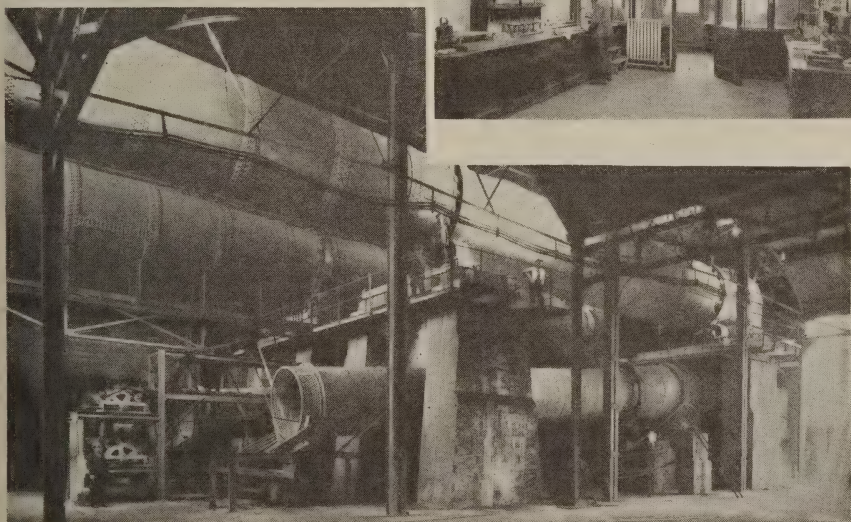
This is known as the Sun and Planet mixer, the revolving arms of the apparatus being carried across the tank, while at the same time the whole contrivance moves slowly round the tank. Thus every part of the mixture in the tank comes within the scope of the revolving arms in turn, and the tendency to settle is arrested.

The slurry is then raised as required, by means of three-throw slurry pumps to a pipe line feeding other slurry tanks at the base of the rotary kilns, from which it is pumped up to and passed into the kilns. The quantity passing into the kilns can be regulated, separately for each kiln, according to requirements, the whole being regulated on the firing platform by the operator in charge of the kilns.

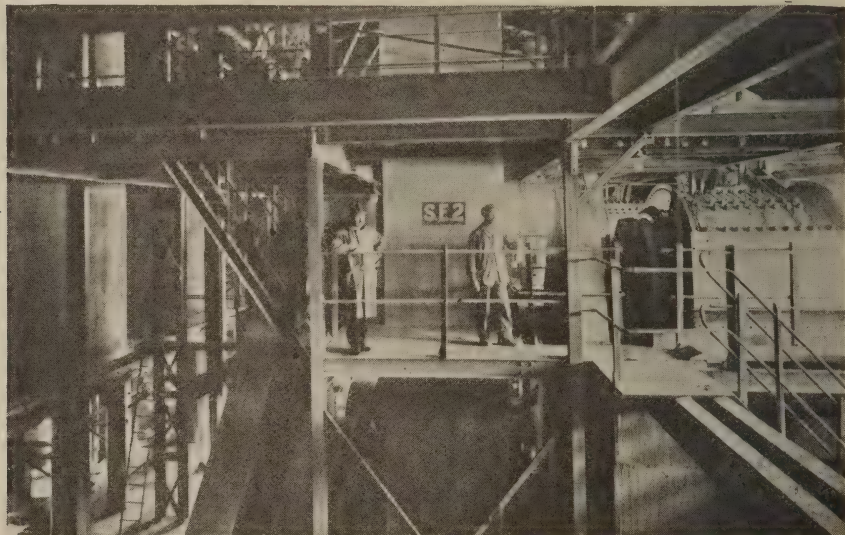
There is much that is intensely interesting in a cement factory, but per-

haps the working at the kilns is the most fascinating part of the whole process. Here are the two huge stacks, 200 feet high, built of reinforced concrete, and three steel stacks of smaller dimensions. Attached to these stacks are the five rotary kilns, three each 130 ft. long by 8 ft. diameter and two 200 ft. long by 9 ft. diameter and 10 ft. in the burning zone. These cylinders are lined with special firebrick, are mounted on rollers and slowly rotate at varying speeds as required. They are motor driven with suitable gearing and are inclined towards the firing end—the burning zone as it is called.

The slurry is pumped (as already described) from the tanks below and falls in measured quantities at a regulated speed into the raised ends of the rotary kilns, down which it travels by gravity, meeting the heat from the burning zone, where there is a constant temperature of approximately 3,000° F. By this means the water is driven off and passes up the



Kilns and Coolers—Laboratory Above



Raw Material Grinding Plant

stacks. The dried and partly calcined material passes on to the burning zone, in which the calcination of the material is completed, and through it into other revolving cylinders below known as coolers. These, inclined also but running back for an extent of about 70 feet, carry the calcined material or clinker to a gravity bucket conveyor which carries the clinker directly to the belt conveyor which feeds the hoppers over the clinker pulverizing mills or alternatively to the clinkers store.

All clinker not immediately required for grinding is conveyed to a clinker store of 7,000 tons capacity. The surplus clinker is deposited at any point down the center of this store by a simple device for tipping each bucket of the conveyor as it passes. The Jeffrey conveyor also recovers the clinker from the store as required by the grinding department.

It is interesting to note how the coal used is prepared for combustion in the kilns. The coal used for calcining is of a special quality and is first dried by passing through Ruggles-Coles revolving dryers and then passes to high speed Griffin pulverizing mills, where it is reduced to a very fine powder. The pulverized fuel is conveyed and elevated to feed

hoppers situated at the firing end of the kilns, each kiln having its own hopper, and then conveyed through a pipe by means of an air blast into the kilns, where the volume of pulverized fuel immediately ignites in the burning zone. The pulverized coal hoppers and coal feed apparatus are situated on what is known as the firing platform, where the operator in charge of the kilns—known as the burner—has complete control of all the kilns operations by means of the ingenious system of electrical control gear installed on this platform.

The clinker pulverizing department consists of batteries of ball and tube mills and Fuller and Griffin mills of the high-speed type. Here the clinker is ground to the required fineness and the finished cement is conveyed to the cement store.

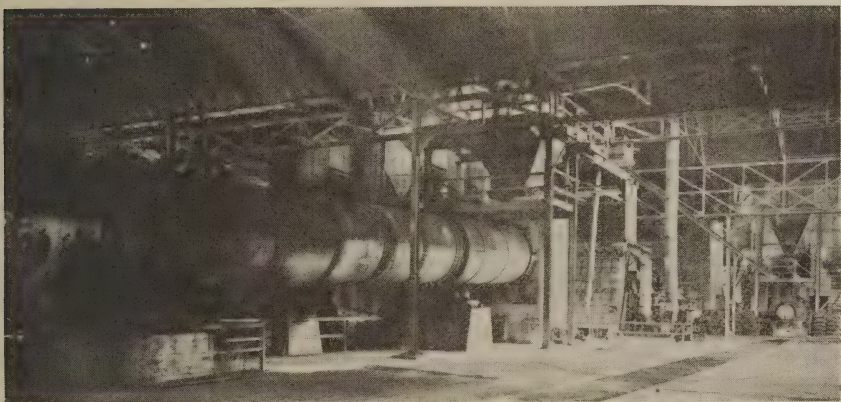
The storage consists of huge reinforced concrete bins with a capacity of upwards of 15,000 tons, and here the cement is retained until required for despatch to customers. The system of depositing and recovering the cement is by conveyors of the steel worm type and elevators. This store adjoins and runs the full length of the packing department.

The packing department is a model of ingenuity and convenience. On one side are the packing machines which are separated from a railway siding by





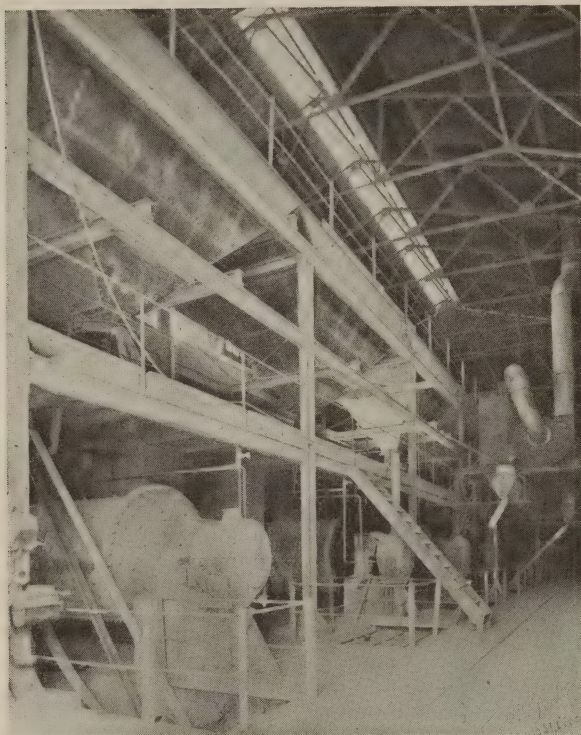
Private Wharf on Ship Canal



Kiln No. 3



Power Station



Raw Grinding Plant

a working platform of concrete. The cement is drawn from the storage bins by extracting worms and carried by conveyors and elevators to the machines in the packing department.

Certain of the machines in this department are equally suitable for packing into sacks or bags, or into casks as required. These work in pairs. Then there are Bates valve bag packers with spouts for filling bags alone, four at a time, and by the ingenious method adopted they are filled and weighted after the mouth of the bag has been tied and are immediately ready for conveyance. The sacks on the other machines have to be tied and the casks "headed up."

The filled sacks and casks are trucked across the platform to the waiting wagons, for conveyance inland by rail, or to the wharf for shipment to other ports in the British Isles or abroad. Wagons of various railway companies, or the Cement Company's own wagons, are used ac-

cording to destination. Excellent arrangements are provided for loading large quantities by motor vehicle. The company run a number of their own vehicles and deliver the cement direct to the job.

The company pack their casks by a unique method with special machines by which they definitely insure the casks reaching their overseas destinations, oftentimes involving innumerable handlings, with their contents intact, both as to quantity and quality. The company have at their works a cask of English brand Portland cement that has traveled practically around the world, covering a period of 15 months. Notwithstanding having passed through varying climatic conditions, and in the order of things having received more or less rough usage, both the package and contents are in perfect condition.

An interesting and distinctly necessary department to the manufacture of cement is the provision of casks for carrying overseas the production of the mills.

The works have a cooperage fully equipped with the most modern cask-making machinery of great producing capacity to deal promptly with orders installed in an extensive building in which the whole process of cask-making is carried through with remarkable celerity and efficiency. On the works estate are thousands of tons of stavewood stacked awaiting the call of the coopers.

The stavewood when wanted is taken to the cooperage, shaped at the ends for casks, tongued, grooved, heated, hooped, etc., until having gone from end to end of the building and passed through a score or more different hands it finally emerges the finished cask, only awaiting the cement, the head and the labels to be ready for its journey to some far-off clime.



Any size and kind of cask can be supplied according to customers' requirements.

Carbo-limo is the finest grade carbonate of lime, being the limestone from the company's own quarries pulverized by the special machinery at the works to a fine powder. This department is equipped with storage bins of great capacity for the raw materials; batteries of Griffin and Fuller and ball and tube mills; storage bins for the finished product, all connecting and served by elevating and conveying plant similar to the other pulverizing departments.

One would naturally expect a large amount of dirt and dust when visiting a cement works, but at these works there is such a fine system of dust collectors installed at considerable expense in all grinding departments that the absence of dust is particularly noticeable. The principle of these dust collectors is to draw the dust and steam from the delivery end of each mill and dryer. The steam and dust thus drawn into the machines is separated in special flannel bags in a series of chambers, the dust being retained and the moisture passing to atmosphere. That the trouble and expense in installing these advanced methods have been justified is seen by the remarkable healthy appearance of the workers.

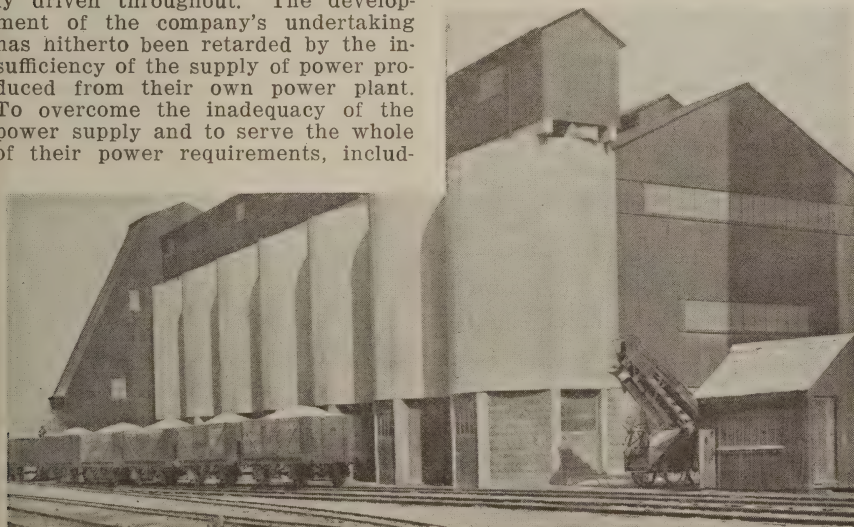
The works machinery is electrically driven throughout. The development of the company's undertaking has hitherto been retarded by the insufficiency of the supply of power produced from their own power plant. To overcome the inadequacy of the power supply and to serve the whole of their power requirements, includ-

ing that required for the plant just completed, the company some time ago contracted with the Mersey Power Company for a bulk power supply.

This current is delivered at 33,000 volts pressure from the Mersey Power Co.'s new station at Weston Point, Runcorn, through a duplicate set of mains laid along the bank of the Ship Canal to the power station on the cement works estate. This current is passed through transformers and delivered to the Cement Company's equipment at 3,000 volts for the 350 H.P. A.C. 3-phase motors driving the ball and tube mills in the wet and clinker grinding departments, and at 440 volts A.C. 3-phase for the other motors.

The voltage for lighting and sundry motors driving accessories being 250 volt D.C., a 440 volt connection is passed through the Cement Company's own sub-station and is reduced by rotary converters to 250 volts D.C. as required. The Cement Company deliver the current to the various departments through cables hung on brackets in covered concrete trenches, in which are also laid water slurry and other service pipes, and the whole installation being very accessible.

The works is also provided with up-to-date mechanics', electrical, joiners', etc., shops to effect speedy repair and constructional work.



Storage Bins for Raw Materials

## Valuation of Deposits

(Continued from page 97)

to subsidize the contractor who was operating a quarry in red Traissic shale. This shale was easy to drill and crush, and was fairly hard when freshly broken. After a year or two, however, the shale began to crumble and disintegrate into a clay like substance.

To relieve this situation, a fourth quarry was opened on a large butte of diabase within about one mile of the main line of the railroad. Although this plant was new, and had ample trackage facilities, it was foredoomed to failure, as the rock was even harder to drill and crush than the quartzite. The irony of the whole situation was that all this time there was a perfectly good deposit of excellent ballast rock directly along the tracks of the railroad and at a central location.

Many parallel cases of the unfitness of some stone deposits for the economic production of crushed stone may be given here, but the above examples should serve to illustrate what an important factor the quality of stone becomes when considering the true value of a stone deposit.

### Ease of Production

There are certain elements in every quarry operation which have much to do with the cost of production, but which may vary for different localities. Any feature which has to do with the cost of production has also to do with the earning power of an enterprise. These are physical features, some of which may be enumerated here without going into detail of example. The hardness and breaking properties of the stone, mentioned in the last paragraph, has to do with the cost of production. The amount and character of the overburden and the distance to which it must be moved is a variable element of cost. The workable thickness of the stone itself and the

amount of drilling and powder required per ton of stone produced are elements of production cost. The amount of water to be handled and the ease with which the stone can be moved from quarry to crushing plant are elements of cost. The topographic and structural features of every quarry, either add to or reduce the cost of production, as the case may be. The ease of physical production is therefore another factor which must not be overlooked when considering the value of a stone deposit.

### Relation to Market

The question of nearness to market and to transportation is one of inestimable importance. It matters little how large a stone deposit, how desirable the physical and chemical properties of the stone may be, or how cheaply it can be produced if it is so remote from a permanent market that the cost of transportation absorbs all of the profits. It is plain to see that a stone proposition which can deliver into a consuming market at 5 cents per ton less than a competitor is worth 5 cents per ton more at the point of production, all other things being equal. The matter of cost of transportation therefore makes economic production of some stone deposits prohibitive, at least under present conditions. Here the value of a stone deposit is again reflected in its relative location with respect to market.

### Relative Abundance

Any stone deposit which is isolated, and is close to a strong market, has, of course, special value. If on the other hand it is surrounded by similar deposits, with equal working conditions and large stone reserves, the question of valuation must be based largely on its relative stone reserve, and upon the price at which any or all of the properties can be purchased. Invariably, one of the first considerations that confronts a party who



seeks a location for establishing a stone-crushing industry is the matter of competition. What he naturally wants to find is a location where all other things being equal, he will at least have a market for a reasonable portion of his output, which he can depend upon as his own.

Where two or more stone-crushing companies are operating on the same body of stone, having the same physical conditions, the same labor conditions, and the same market, if one company outstrips its neighbors in economic production, the reason for greater efficiency can be quickly traced to superior equipment and management. The relative abundance of stone, therefore, in a given locality, unless it is all controlled by one company, has an important bearing on the value of individual deposits.

#### Conclusions

Much has been written on the valuation of ore deposits, but I have seen but few references to the valuation of stone deposits. It is evident that there can be no definite formula for the valuation of either mineral deposits or stone deposits, but there are many things in common which have to be taken into consideration. Everyone knows that capital, plant design, and management have largely to do with the successful operation of any undertaking, but I do not feel that these factors have anything to do with the value of the stone deposit itself, and therefore should not be open for discussion here. An active quarry operation, like a mine, is subject to continuous depletion. According to Berry, present value means the value today of the future earnings of an enterprise. On account of the uncertainty of the life of a stone-crushing enterprise, due in part to such changeable elements as market conditions, management, and labor supply, the present value of a marketable quarry property should represent a sum of money upon

which not less than 8 per cent can be paid out to the net operating income, in addition to a reasonable rate of amortization.

I feel that the points brought out in this brief paper, though elementary, are pertinent, and should be suggestive to those who have not given serious consideration to the matter of valuation. Though a few examples have been given above, each quarry proposition has its own peculiar features and its own individual problems. It is evident that such factors as are mentioned above, and which enter into the valuation of every stone deposit, must vary widely with different properties and different localities. Wide experience, keen observation and mature judgment help to reduce the error in such calculations.

### Pennsylvania Crusher Company Opens Chicago Branch

In order to better serve Western customers and properly meet the increasing demands from cement, lime, gypsum and crushed stone plants for Pennsylvania single roll crushers and hammer crushers, the Pennsylvania Crusher Company has recently opened a district office in Chicago, in charge of Mr. C. S. Darling. Temporary quarters have been secured at the Monadnock Building, but after May 1st the office will locate in the new Illinois Merchants Bank Building.

Single roll crushers for primary breaking and hammer crushers for secondary and finer crushing as manufactured by the Pennsylvania Crusher Company have been operating successfully under severe conditions for many years in cement, gypsum, lime, flux and other stone crushing plants.

Machinery for coal preparation has been one of the principal specialties of the company. In addition to hammer crushers, and single roll crushers, this apparatus includes Bradford breakers for the initial crushing of mine run coal. Pennsylvania coal crushing machinery is used in cement and lime plants for the preparation of stoker feed and for the initial breaking of coal for gas producers and preparatory to pulverizing for rotary kiln feed.

## Our Eastern Representative

We are pleased to announce the appointment of Mr. S. E. Cole as Eastern advertising representative of PIT AND QUARRY.

Mr. Cole has had a wide experience in the general advertising field, and spent several months at our home office in Chicago, where he gained



S. E. Cole

familiarity with our publication and our industries, before taking up his residence in New York. He is entirely familiar with the Eastern territory, and has rapidly developed a close relationship with the men in our particular field. Mr. Cole is located at 50 Morningside Drive, New York, where he can be reached on business connected with this publication.

The Ohio Portland Cement Company has been incorporated at Wilmington, Del., with a capital of \$3,000,000.

## Hand Book This Month

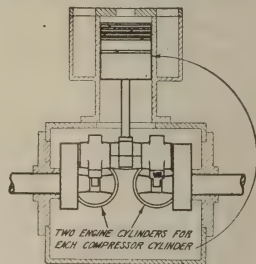
The publication of PIT AND QUARRY HAND BOOK has been delayed somewhat owing to a fire at our printing plant, but it is now well under way and the book will appear during the present month.

The interest taken in the publication of this book shows that it is establishing a place for itself in our field and will be a volume of increasing value from year to year.

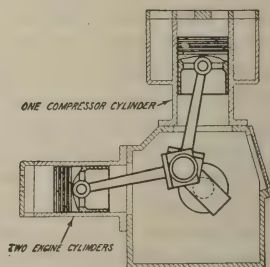
## Portable Air Compressors

A line of useful portable air compressors is made by the Domestic Engine and Pump Company, Shippensburg, Pa.

Domestic portable air compressors are described as complete self-contained units, generating the power



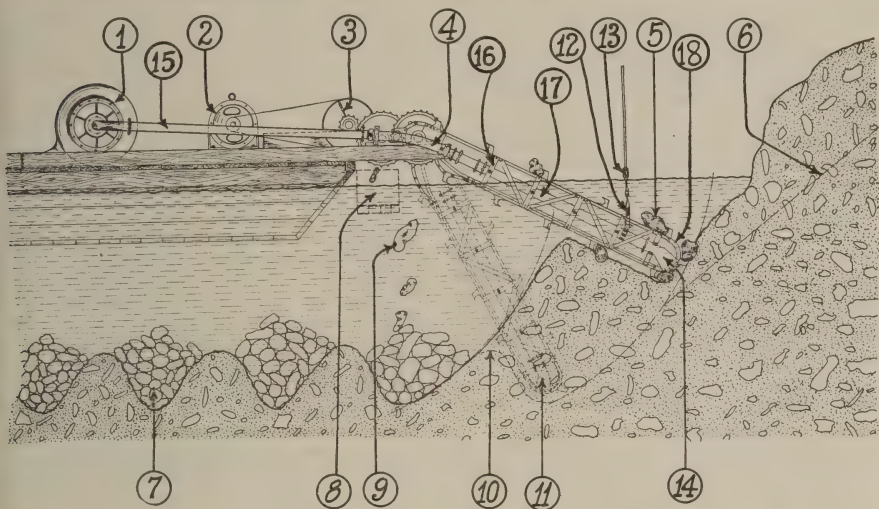
and transmitting it to compressor without transmission losses. The crank arrangement enables the maximum mean effective pressure of the engine to be applied against the heaviest part of the air compression stroke, and the absence of gears or other



transmission devices reduces frictional losses to a minimum.

These air compressors are used for operating pneumatic tools designed for drilling rock and a variety of other uses.





## Protecting The Suction Nozzle

A story that will be of interest to every user of a suction dredge is told by the accompanying diagram. This was drawn particularly to show the operation of the Swintek traveling suction screen nozzle, a device which has come into use within the last few years, for agitating the material ahead of the intake as well as screening out the boulders, hard clay, cemented gravel, driftwood and other obstructions which would otherwise choke up the pipe, causing suspension of operation until it had been removed.

This suction screen nozzle consists of a truss frame surrounding the intake pipe, on which is mounted an endless traveling chain belt, armed at regular intervals with rows of projecting jaws which cut into the bank, stir up and thoroughly agitate the sand and gravel, allowing it to flow readily into the pipe, while it screens out and carries away from the nozzle all boulders and other large and undesirable material.

It will be noted from the diagram that these things thus taken up are dropped from the head of the screen behind the working point of the nozzle and are left in piles as the boat travels forward, as at the point designated No. 7. Most of the points on the diagram will be self-explanatory, so that attention will not be given to all of them. It will be noted, however, that No. 14 is the intake and that the trav-

eling screen passes over this intake, being operated by the motor at point No. 2. At No. 5 will be noted a large stone in process of being carried by the jaws of the traveler, and at No. 9 is another similar stone dropping from the head of the traveler onto a pile below and entirely out of the way so that there is no possibility of it being picked up again. At No. 3 is a safety clutch that automatically stops the traveling screen should the jaws come up against anything so large or so solid as to threaten breakage to the equipment. At No. 4 is a flexible hose coupling, so that the nozzle can be moved from the position shown by the dotted lines at No. 11 to any higher point desired.

If it is desirable to save the boulders which are taken up by the machine, a small pontoon boat, as shown at No. 8, can be used to catch them from the head of the belt instead of allowing them to fall into the pockets at the bottom of the river bed.

This nozzle may be attached to any pump boat with very little alteration of its equipment. The largest one so far made has been a 62-foot nozzle built for the Western Indiana Gravel Company at Terre Haute, Indiana.

The Swintek traveling suction screen nozzle is manufactured by the Swintek Traveling Suction Screen Nozzle Company of Eddyville, Iowa.

The Utica Lime Co., Seymour, Indiana, has increased its capital stock from \$10,000 to \$35,000.

## Recent Patents

1,444,827. Controlling system for mine-blasting operations. Samuel F. Bridwell and John F. Kennedy, Terre Haute, Ind.

1,444,991. Crushing and grinding mill. Oscar Wauthier, Brussels, Belgium.

1,445,013. Cableway-carriage. Gerold Frink, Seattle, Wash.

1,445,084. Coal-loading machine. Joseph F. Joy, Pittsburgh, Pa., assignor to Joy Machine Co., same place.

1,445,085. Mining apparatus. Joseph F. Joy, Pittsburgh, Pa., assignor to Joy Machine Co., same place.

1,445,086. Drill. Joseph F. Joy, Pittsburgh, Pa., assignor to Joy Machine Co., same place.

1,445,087. Coal-loading machine. Joseph F. Joy, Pittsburgh, Pa., assignor to Joy Machine Co., same place.

1,445,097. Detachable bit for coal-augers. Fred McLaughlin, Canton, Ill.

1,445,116. Stop mechanism for cableway-carriages. William M. Venable, Pittsburgh, Pa., assignor to Blaw-Knox Co., same place.

1,445,230. Mining apparatus. Edmund C. Morgan, Chicago, Ill.

1,445,468. Fair lead for drag-line excavators. Svante R. W. M. Bager, South Milwaukee, Wis., assignor to Bucyrus Co., same place.

1,403,583. Percussive rock-drilling apparatus. Richard H. Adams, Cobalt, Ontario, Canada.

1,403,829. Mining machine. Albert Ball, Claremont, N. H., assignor to Jeffrey Mfg. Co., Columbus, Ohio.

1,403,843. Side-dump car. Charles H. Clark, Dormont, Pa., assignor to Clark Car Co.

1,404,064. Excavating mechanism. Bowie G. & Harlon D. Simmons, Lexie, Miss.

1,404,515. Clamshell-bucket. Daniel Ferry, Pittsburgh, Pa.

1,404,560. Ore mill and the like. Henry T. Wiley, Cake, Ore.

1,404,982. Combined crusher and mill. Harry Loeven, Douglas, Ariz.

1,405,151. Centrifugal ore crusher. Gustave A. Overstrom, Pasadena, Cal.

1,405,269. Screening apparatus. Carl W. Bruce, Toronto, Ontario, Canada.

1,405,652. Power-shovel. Cyrus H. Wolfe, Charlotte, N. C.

1,405,653. Shovel. Cyrus H. Wolfe, Charlotte, N. C.

1,405,796. Excavating machinery. Bruce A. Middlemiss, Chuququi Cama-

ta, Chile, assignor to Chile Exploration Co., New York, N. Y.

1,406,189. Crushing-machine. William M. Hoppin, Sharon Hill, Pa.

1,406,274. Dump-car. Walter P. Murphy, New York, N. Y.

1,406,291. Sand-washing device. Edmond Shaw, El Paso, Tex., assignor to Allen Cone Co., same place.

1,406,327. Bucket - door - closing mechanism. Franklin E. Arndt, Galion, Ohio, assignor to Galion Iron Works & Mfg. Co., same place.

1,406,660. Coal-mining apparatus. Nils D. Levin, Columbus, Ohio, assignor to Jeffrey Mfg. Co., same place.

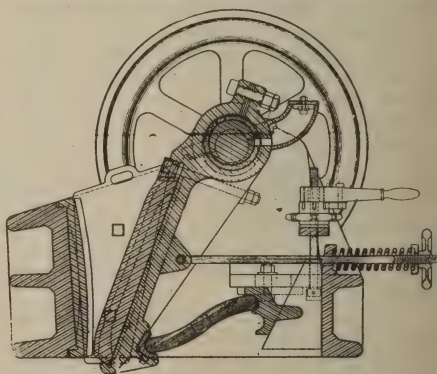
1,406,849. Cleaning device for excavators. George H. Greimann, Garner, Iowa, assignor to Greimann Ditcher Co., same place.

1,406,906. Air-feed control for rock-drills. William H. Smith, Detroit, Mich., assignor to Ingersoll-Rand Co., New York, N. Y.

1,406,907. Air-feed control for rock-drills. William A. Smith, Detroit, Mich., assignor to Ingersoll-Rand Co., New York, N. Y.

## Cedar Rapids Crusher

The Iowa Manufacturing Company, Cedar Rapids, Iowa, is manufacturing a jaw crusher, known as the Cedar Rapids, which is recommended for gravel, boulders, limestone, trap rock or granite, crushing to sizes varying from 2½ inches down to ½ inch. Ad-



justments to different sizes are made without stopping the machine.

Wearing parts are of manganese steel and bearings of phosphor bronze. Jaws are reversible. The machine is made in jaw opening sizes of 9x12 inches up to 14x36 inches.



## Memphis and Elsewhere

### Producers Finding Good Market for Their Various Products

By Our Memphis Correspondent

The month of February was unexpectedly severe in wintry weather in Memphis and the Mississippi Valley section, opening with a temperature of 14 degrees above and a snow on February 3. There was a recurrence of this cold snap without the snow in the middle of the month and quite cold to the last week. There have been some heavy rains and work out of doors was much interrupted. Cars are rather scarce and while the spring aspect is bright in gravel, crushed stone and cement lines, the magnitude of 1923 operations betokens that it will be a policy of handle business at the most opportune time.

The correspondent of Pit and Quarry called on C. D. Smith & Co., 1630 Exchange Bldg., Memphis, who are large operators of gravel pits. They have two gravel properties in Mississippi, one in Tennessee and one in Kentucky. These are as active as weather conditions permit. They are getting out railroad ballast and macadam for highway work. The firm reports cars and delivery somewhat impeded. They look to see a good spring activity.

The Allen Gravel Co. in the Exchange Bldg., Memphis, was visited. Mr. Peete is in charge of the Memphis office and Mr. Miller, the president of the company, makes his headquarters at Little Rock. They feature Allen's Tishomingo gravel, which has found much favor with road builders in this section. The quarries are in Mississippi near Iuka. This firm has just landed a big contract in Calhoun County, Miss. for furnishing the gravel for thirty six miles of road work. As soon as weather and other conditions allow, deliveries will be made at the rate of about twenty carloads per day.

Mr. Miller, of the Allen Gravel Co. visited the Memphis office this week. He reports good activities in prospect in Arkansas. Much interest is being taken in the proposition of building a viaduct on the Arkansas side as an approach to the Harahan bridge that spans the Mississippi river at Mem-

phis. This is badly needed. Crittendon county has a fine macadam road but conditions immediately after leaving the bridge could be greatly improved from the road standpoint. Federal aid and aid from the states of Tennessee and Arkansas could expedite and complete the work. The Arkansas legislation now in session has been rather conservative on roadwork and other outlays. The entire week of March 12, Little Rock is to enjoy a celebration incident to the formal opening of the Broadway bridge over the Arkansas river to North Little Rock. City and state officials, the engineers and contractors are on the program for addresses and there will be a program put on by the merchants.

The Greenville Stone and Gravel Co. with offices on Walnut st. with the Fischer Lime and Cement Co., is active in supplying many of the contractors of Memphis with materials. The works are operating along the Mississippi river at Greenville and have been fairly active all the past year. They are splendidly equipped. The Fischer Lime and Cement Co. have crushed stone quarries at Williford, Ark. These are active. The warehouse at Memphis of the Fischer people has just been completed, the office, display, and dining room for employes occupying the front of the new addition up stairs, one corner of which has been unfinished until now. The entire structure occupies almost a block along the Southern R. R. at the intersection of Walnut st., Vance ave. and Pontotoc. The company is admirably equipped with trucks for city delivery and every convenience at their warehouse.

The Missouri Portland Cement Co., U. and P. Bank Bldg., Memphis, are adding considerable to their plant in the north part of the city along Wolf river, for the loading and unloading of sand and gravel. They report a good outlook in the building trade. Their product is now handled principally by rail. Formerly they operated several boats.

The Wolf River Sand Co. is active at Memphis and is operated by interests similar to the Fischer Lime and Cement Co. and the Greenville Stone and Gravel Co. The office is at 4 North Front St., Memphis, yard at Chelsea and Paine. Wolf river sand and gravel is sharp and clean.

## In Shape for Business

### Eastern Producers Will be Ready For Spring Rush

By Our Eastern Correspondent

The season finds the crushed stone, sand and affiliated industries in excellent condition in the eastern district, with call for material far greater than ordinarily to be expected. The extensive building construction which has been going on during the past year, breaking all previous records, is expected to continue with the same force and energy throughout the coming year, and sand and gravel producers anticipate an unprecedented demand as soon as the winter is over.

Production districts have curtailed operations with the coming of inclement weather, but the reserves on hand are more than sufficient for all immediate orders. Rock crushers in different sections are still running and sizable working forces are being employed. Men are a little more plentiful than in the weeks past, and the labor situation shows improvement.

The stone market looms as a feature in the industry during 1923, and plans are being perfected for an active campaign to encourage the use of this material for residential and other service. Granite dealers, particularly, look for a heavy spring business, and present estimates indicate an advance in prices of from 10 to 15 per cent over the levels of a year ago. New England quarries are arranging for a heavy production and the settlement of the strike means that there will be a full blast in this direction at an early date; the men have accepted a wage rate of \$1.00 an hour on the basis of a 44-hour week.

While there is no change in market levels at New York and vicinity in the line of sand, gravel and crushed stone, there is a tendency of extreme firmness in present quotations, likely to result in an advance with the advent of spring. There is no denying the fact that there is an increased cost of handling during the cold weather period and supply dealers may effect higher retail levels even before the time noted.

Sand at New York holds at \$1.00 a

cubic yard in wholesale lots, while in the retail market dealers are asking \$2.00 for first zone deliveries. Grit is selling for \$1.75 per cubic yards, wholesale. Clean, sharp white sand is being retailed at \$4.50 a cubic yard at the different supply yards.

Gravel of the best grade maintains at a \$2.00 a cubic yard level both for 1½ and ¾-inch material in cargo lots, wholesale. There is a fair supply of stock available for immediate distribution at this figure. Dealers are asking \$2.75 a cubic yard, delivered.

With a decreased demand for 1½-inch crushed stone, a decline of 10 cents a cubic yard has temporarily been placed in force, making a figure of \$1.65 for this material to dealers and contractors; ¾-inch stock retains a \$1.75 level, f.o.b. carload lots. Dealers are holding to a \$4.00 price for both sizes of material, delivered on the job in Manhattan and Bronx boroughs.

There has been an increase in Portland cement in the wholesale market at New York, the price now fluctuating from \$2.60 to \$2.70 a barrel, less bags, in carload lots, not including cash discount. This advance is due to the heavier cost of transportation and handling during the winter season. The building supply yards are holding to a \$3.20 and \$3.30 level, with customary bag rebate. There is a good call for the commodity, considering the season of the year, and stocks are securable in desired quantity.

Warehouse prices of lime show hydrated finishing material at \$16.90 to \$17.10 a ton, with common hydrate priced at \$13.10. Common lump lime is \$3.00 to \$3.10 a barrel, while finishing material of this character is at \$3.75 a barrel. In the retail market, finishing hydrate is being delivered by dealers at \$24.00 a ton, in paper containers; common hydrated lime, in paper, is \$19.50 a ton, delivered on the job. Common lump lime, in standard 300-pound barrels, is being retailed at \$3.75 a barrel, and finishing material, same size barrel, \$4.50, both delivered. Neat wall cement plaster is being sold at the local supply yards at \$21.00 a ton, while finishing plaster in 250-pound barrels, is being sold at \$4.00.

The State Legislature, New York, is considering a bill introduced by Senator Lacey, Buffalo, covering boundary waters of the state, removing the present restrictions requiring the consent



of the land boards before sand and gravel can be taken from the waters. The measure is designed primarily to assist the city of Buffalo in the elimination of the present monopoly of sand and gravel privileges with respect to the Niagara River. If the bill is approved and becomes a law, the city will be able to take sand and gravel from the river at Squaw Island, the only restriction being the consent of upland owners, provided that dredging is done within a certain distance of the shore.

The Seymour Trap Rock Co., New York, has been formed under Delaware laws with capital of \$500,000, to operate a rock quarry and crushing plant.

The Albany Crushed Stone Corporation, Albany, N. Y., recently organized with a capital of \$300,000, will operate a plant in this section. The company is headed by D. H. Craw, L. Murray, and G. D. Kittredge. It is represented by Visscher, Whalen, Loucks & Murphy, Albany.

The Black River Sand Corporation, Utica, N. Y., has recently formed a merger with the Boonville Sand Corporation, Boonville, N. Y. The consolidated company is planning for extensive operations early in the spring.

The Rockaway Sand & Gravel Corporation, Inwood, L. I., recently formed with a capital of \$20,000, will operate local sand and gravel properties. The company is headed by A. S. Schurachio, F. D. Licourse, and F. Lavelle, and is represented by T. J. McGuir, Cedarhurst, L. I.

The Hothorn Sand Co., Kenil, N. J., is planning for extensive production at its local sand properties at an early date. The company has recently installed electrical equipment for use at plant, utilizing local central station service for power supply.

The recent receivership of the Eastern Potash Corporation, New York, with plant practically completed in the Raritan River section of New Jersey, has developed into a complicated case, owing to the institution of various court proceedings in the last few weeks. Counsel for the equity receivers, Joseph H. Quigg and James Kerney, appointed January 12, charges that the company was organized primarily for stock-selling purposes. The plant at Raritan has been laid out for the purpose of producing potash, brick and kindred products, using New Jersey green sand for this purpose.

Green sand property is held by the company at Lakewood, as well as in the vicinity of McAfee, operated by a subsidiary organization. The plant as it stands is said to represent an investment of more than \$150,000, and has never been operated. The company was also interested in the Raritan Refining Co., oil products, which has a plant nearby, and this organization, likewise, is now in the hands of a receiver.

O. H. Leaman, Inc., Montclair, N. J., has been organized with a capital of \$50,000, to operate stone and granite properties. The incorporators are Frank E. Tupper, W. H. and Joseph L. Collings. The office will be at 400 Orange Road, Montclair.

The Bethlehem Steel Corporation is operating under good capacity at its limestone rock properties, McAfee, N. J., giving employment to a large working force.

The Lime & Stone Products Co., Hamburg, N. J., has arranged for the use of electric power equipment at its quarry, and plans for considerable increased operations. The local power company has built an extension to its 33,000-volt transmission line to the company's quarry. The total equipment will develop an output of 500 kilowatts.

A number of slate quarries in the vicinity of Slatington, Pa., are maintaining operations on a winter schedule of 9 hours a day, giving employment to regular working forces. Similar plants at Danielsville and Harper are running on a like schedule. Sizable orders are being booked.

The Central Sand, Stone & Supply Co., Johnstown, Pa., has been formed under Delaware laws with a capital of \$30,000, to operate sand, gravel and stone properties. Extensive operations are planned. The company is headed by H. B. and C. M. Toomey, and Leroy J. Scanlon.

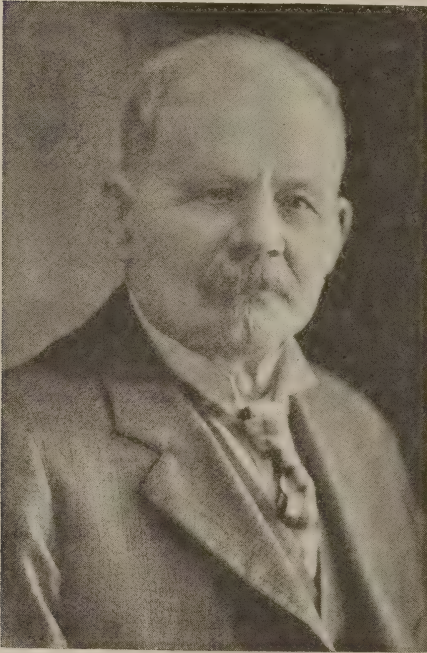
G. G. Stoudt has purchased the sand quarry and plant of William H. D. Godshall near Montgomeryville, Pa., and plans to operate the property. It consists of a tract of 9 acres, with extensive deposits; the buildings and machinery will be improved, and it is proposed to install additional equipment at a later date. Railroad sidings are available at the plant. Schoch & Markert, 6001 Oxford Street, real estate, handled the negotiations bringing about the change in ownership.

## Death of Crusher Manufacturer

The death of Milton Franklin Williams, president of the Williams Patent Crusher and Pulverizer Company, occurred in St. Louis Feb. 8, from septic pneumonia.

For the past 18 months he had been confined to his home on Vernon avenue, suffering from diabetes.

In the last 10 years he had derived considerable pleasure in gathering data



Milton Franklin Williams

for "The Williams History," a genealogical history of his family and an account of the growth of his business. This he has had published and printed at his own print shop for private distribution among his friends, relatives and for deposit in various historical societies, the Mercantile and Public libraries.

Williams came to St. Louis more than 50 years ago and started in as a millwright in a small machine shop. He originated the swing hammer crusher and pulverizer in 1895, and in

1897 incorporated his machine works under the present name. The products of the firm are now sold in many foreign countries.

He is survived by a widow, three sons—Milton Judson of Chicago, Arthur F. of Clayton, Oliver J. of San Francisco—and a daughter, Mrs. Edgar M. Carson of St. Louis.

The Kickapoo Sand and Gravel Company is putting in a new washing and screening plant at Peru, Ind., including a 24x70 foot steel pump boat with 10-inch Amsco pump, 200 hp. General Electric motor, and 55 foot Swintek traveling screen. Circular concrete bins, three in number, 20 feet in diameter and 30 feet high, with steel structure on top, are being constructed by the Polk-Genung-Polk Company of Ft. Brauch, Ind. The pump boat will discharge over a grizzly into a sump, from which another 10-inch Amsco pump will elevate it to Gilbert screens. The oversize will go to two No. 4 angle-drive Austin crushers. The plant which will be ready for operation in May, is located on three railroads and four traction lines.

Harley C. Flourney, of Quincy, Plumas County, Cal., is planning to construct a large kiln at his lime deposits near Virgilis. A recent chemical analysis of the lime from Mr. Flourney's deposit disclosed the fact that it is of unusually high grade, and it is his plan to build a cement plant there as well as a kiln. Work is being started at once although it will be almost two years before the development plan is completed.

The Potomac Valley Stone & Lime Company of Hagerstown, Md., has sold about 165 acres of land located along the canal near Pinesburg, to the Keystone Lime Company. The purchase price amounted to around \$60,000. Dr. J. McP. Scott is president of the Potomac company.

The Hugger Bros. Gravel Company, Montgomery, Ala., has changed its name to the Alabama Sand and Gravel Company.

The Excavating & Screening Machinery Co., St. Paul, Minn., has recently announced its removal into new and enlarged quarters at 726 Raymond Avenue.



## What's All This About?

### Indiana Is Wrought Up Over Types of Road to Build

By Our Indianapolis Correspondent

Representative James I. Day, of Gary, Ind., has withdrawn his bill in the Indiana general assembly which would have prohibited the Indiana highway department from constructing in one year more than 30 per cent of one type of hard surface road. Withdrawal of the bill came as a surprise to those who have been interested in it and have pointed out what they termed some questionable merits of the bill. When he was questioned as to his reason for withdrawing the measure, the sponsor said, "Why do you wish to know? Well, they were going to kill the bill, so I withdrew it before they had a chance. Do not worry, the bill will be back later. The senate will pass on it and then we can act on it here, whereas, if it had been killed, the house could not have acted on it again." The bill would require the highway commission to receive bids on five types of hard surface roads and it contained certain provisions concerning bonds and obligations to contractors. It was attacked by members of the roads committee who declared it was designed to aid the brick interests in having more roads paved with brick. This was denied both by the author and several paving brick company representatives.

J. C. Kelly, president of the Indiana Highway Industries, asserted recently that it has been notorious that present Indiana highway specifications bar competition among the different types of pavements. In a statement he said: "Last year, out of approximately 125 miles of pavement let by the commission, all but seven miles were concrete. This seven miles of brick was laid only after the Indiana brick manufacturers made a strong protest to the state administration of the conditions that exist. It has been the policy of the highway department to purchase the cement needed for concrete roads and contractors bidding on such roads did so with the understanding that the cement would be furnished. This was not the case with brick and asphalt and the consequences were that the bids showed a wide divergence."

A bill, by which the county commissioners may act as their own contractors, and thereby cut out much of the "contractors' profits" in highway construction, has been introduced in the Indiana general assembly. Under the bill, whenever all bids are received for bridge or road construction work and the board of county commissioners feels that it can do the construction work itself just as efficiently and with less expense, the members may hire their own technical men and engineer and have the construction done under their own direct supervision.

Employees of the Marengo Limestone Company, at Marengo, Ind., have filed a petition in circuit court there asking for the appointment of a receiver to take over and operate the business and from the proceeds discharge the indebtedness against the company. Many of the employees hold checks issued to them by the Marengo Limestone Company for labor, issued in September, October and November of last year. The employees have claims against the company in amounts ranging from \$25 to more than \$200 each. The company spent a large sum last year in improving and developing its property so as to lower the cost of production. A prolonged car shortage in the fall prevented shipments of stone and cut off most of the income at that time when the surplus was virtually exhausted in the work of development and improvement.

The S. & L. Gravel Company has been organized at Kendallville, Ind., to do a general producing business. The company has a capital of \$3,000 and the organizers are Lee Sadler, Frank J. Latendresse and Euclid Latendresse.

The Granite Sand and Gravel Company of Indianapolis, has created \$50,000 in preferred stock.

Harold E. Saylor of Fort Wayne, Ind., Indiana representative of the Sandusky Cement Company of Cleveland, O., was married recently to Miss Irene Isabel Liggett of Fort Wayne. Following a honeymoon trip the couple will be at home in Fort Wayne.

The Tell City Sand and Gravel Company at Tell City, Ind., has been incorporated with a capital stock of \$40,000. The directors are E. T. Slider, O. G. Reilly, Walter Slider, Charles Herr and Lee Herr.

## January Beat Record

### Kentucky Wants to be a Regular State in Highway Building

By Our Louisville Correspondent

Because of the meeting of the State Highway Commission here the first part of the month considerable attention has been centered lately on the road building program and its promises during the year. Preliminary estimates indicate that probably ten million dollars will be used during the year in highway construction, and while considerably more than this is needed all the signs point toward fairly busy days in road building all through the year. This is a matter of keen interest not only to contractors, and quarry men serving the road project needs, but also to the local sand and gravel people.

Meantime the winter has developed an unusual volume of building not only in Louisville but in other cities and towns throughout the state, so that on the whole the sand and gravel people have had a record volume of mid-winter business. This is due in part to the fact that the winter in the main has been one of mild open weather, but back of it is an evident determination to try and get building operations as nearly as practical on a year around basis.

Anyway January beat all building records with a total in permits in Louisville for approximately three and a half million dollars. The reports from Lexington, Paducah and other cities indicate that they are doing well too. As a result the local sand and gravel people are having to draw rather heavily upon their winter stocks to supply the current needs in sand and gravel. There are no river operations going on at present that is no sand and gravel digging consequently it is the reserve piles which must supply the demand.

The Ohio River Sand Co. got in a good stock before the end of the digging season and has no apprehension about being able to supply the needs till the spring digging season opens again though the volume of business this winter has been unusually heavy.

It is pretty much the same story with the E. T. Slider Co. which operates a plant here in Louisville, another on the New Albany side, and still an-

other one down the river which serves some of the Indiana road contract needs. All reports indicate an unusual volume of winter business not only in Louisville but there has been a fair amount of carlot business to other towns and cities in the state. More over the present indications are that the spring shipping business will start early and will be of goodly volume.

There is some apprehension expressed that car shortage may make trouble during the rush of the spring months, but lately the situation as to car supply and movement of freight though slow in spots has been much better than early in the fall.

H. Green, Garrett, Chairman of the Kentucky Highway Commission, who is also interested in lumbering operations, was in attendance at the annual meeting of the Kentucky Retail Lumber Dealers Association at Lexington the past month and when called upon for a few words told something of the efforts to get Kentucky on a par with Northern states in the matter of good roads, and incidentally made a plea that the business men support the idea of having the legislature submit a fifty million dollar bond issue for road purposes to the people for a vote.

The Kentucky Retail Lumber Dealers assembled at the annual convention, many of whom are good customers of the sand and gravel people of Louisville, reported a splendid year's business and busy times ahead. They expect the building boom to continue at least until mid-summer, and to carry on through the year provided material costs and wages do not keep climbing upward until they bring on a buyer's strike such as we had in 1920.

The general temper of the feeling in the structural world here is to get things under control by mid-summer so that there can be either a slowing down or a speeding up depending upon the business outlook and the temper of the public toward continued building. There seems to be no question whatever that the first six months of 1923 will be a boom period. The only air of uncertainty pertains to the latter half of the year and to what may develop in the way of wage contentions and higher costs during the spring season.

The Harston Sand and Gravel Co., Dallas, Texas, has been incorporated with a capital of \$120,000.



## Some Building Figures

### Which Indicate Prosperity in Building Construction for 1923

Answering officially the question being raised all over the country by architects, builders and investors as to why building construction costs and building material prices are again advancing, Representative Ernest R. Ackerman, of New Jersey, has placed in the record under date of February 7, 1923, a report compiled by the Department of Commerce and forwarded January 26th, by Secretary Hoover, confirming building market trends recently observed by The Dow Service Building Reports.

This report shows that building contracts for the country let in 1922 were 51 per cent greater than they were in 1921 while unemployment in Pennsylvania, from which state comes a large quantity of building material used in New York and vicinity, had in the same year declined .89.5 per cent. The report shows a gain in use of silica brick of 105 per cent, 28.9 gain in front brick and a 14.7 per cent gain in the use of cement.

Southern pine consumption increased in the same time 17.3 per cent, Douglas fir 52.5; North Carolina pine 83.4; Northern pine 31.6; Western pine 59.9; Michigan soft wood, 16.1; oak flooring 91; maple flooring 38.9 and structural steel, 87.5; a gain in wholesale price of all commodities reporting to the Department of Labor amounting to 10.6 per cent and gains in enameled sanitary ware of 71.5 for bath tubs; 50.2 for lavatories and 30.1 per cent in sinks.

It is reported in this survey that at the most conservative estimate this country will expend \$5,000,000,000 in new construction or building alteration work in 1923, a figure which apparently does not include possibly \$1,250,000,000 still hanging over from plans and projections filed and counted in 1922's totals. The expenditure of \$5,000,000,000 in one year for construction work recalls the fact that the four years reign of destruction covered by the Civil War represented a total of \$4,000,000,000. In other words, the construction program for this year repre-

sents a billion dollars more than the cost of the Civil War.

Directly referring to the thought being given to the status of housing investment and in the light of vast quantities of projected housing work in this city and vicinity yet to be carried to completion from last year's projections, Mr. Ackerman's report says that "during 1922 over half the building volume increase over 1921 was due to the increase of over 100,000,000 square feet of residential building, or 51 per cent over 1921. The greatest relative increase occurred in industrial building with a gain of 85 per cent, while business building gained only about 40 per cent."

The last recorded cement capacity in the United States shows a total annual output of 146,000,000 barrels. There were 116,000,000 barrels shipped last year. This year's requirements will be near 123,000,000 barrels. Although the forthcoming report of the U. S. Geological survey will doubtless show some plant capacity increase, the cement manufacturers like brick, nail and steel manufacturers, are showing an inclination not to commit themselves far into the future because, outside of fuel disturbances and car shortages, the question of labor supply is reaching a keystone stage, in all phases of construction from the production of raw material down to the finishing touches upon the building itself.

The Universal Gypsum Company has plans under way for the erection of one of the largest plaster plants in the world, at Port Clinton, Ohio. This company, which is capitalized at \$4,000,000 and has its headquarters at Chicago, has a development program contemplating development of all the leading gypsum fields of the country. Wm. E. Shearer is president of the company, E. C. William, vice-president; J. A. Henley, secretary and J. F. Haggerty, treasurer.

Plans are under way to develop extensive gravel deposits at the Balaklava mine in Vallecito, N. Mex. This mine, which was formerly a gold mine, was flooded last June, shortly after the gravel deposit was discovered. It is planned to dewater the incline shaft and start operations from this point.

The Ohio River Sand Company, Jefferson, Ohio, has increased its capital from \$36,000 to \$300,000.

## Ohio Market Firm

### But Some Parts of State Unable to Finance Improvements

By Our Cincinnati Correspondent

With an unprecedented building boom taking place throughout Ohio, and destined to continue through the spring, together with plans being laid for extensive highway construction in the northern part of Ohio, the basic material market in Ohio is firm and looks more encouraging each month. With hundreds of miles of uncompleted roads under contract for construction, Highway Director Leon C. Herrick plans to award additional contracts before the expiration of his term of office which is the middle of this year. Mr. Herrick, although a Republican office holder under a new democratic governor, is going right on and has advertised for bids on highway projects aggregating 47 miles, at a cost of more than a million and a half dollars. It is not certain however that under the present situation that politics will permit the Highway department to go ahead with the work. One of the largest jobs is for 5.3 miles on the Elyria-Twinsburg road in Cuyahoga County, estimated at \$284,923. Another is for 5.6 miles on the Cleveland Sandusky road in Lorain County estimated at \$234,849 on brick, and \$215,094 on concrete. Still another is 5.1 miles on the Oberlin-Norwalk road estimated at \$241,270 with concrete construction.

On the other hand in Southern Ohio, the municipal governments are unable to finance road improvements, and Cincinnati, which is sadly in need of street improvement and repairs, none having been made the last two years, though its necessary retrenchment policy will be no exception to the rule.

In the fact of extensive building operations and cost of material production, a necessary rise in basic material prices took place on February 16th in Cincinnati and vicinity. Washed gravel on that date rose 10 cents a ton. Current prices on washed gravel in the Cincinnati market is quoted at \$1.50 a ton, f. o. b. cars. This includes the 25 cents extra charge of drawing from stock piles instead of direct from the gravel banks. Retailers are getting \$1.80 a ton delivered to place of use. The price of sand has

been tilted 5 cents a ton upward taking effect the same day as gravel. Wholesale quantities of sand are priced at \$1.20 a ton, f. o. b. cars. Delivered on the job, sand is bringing \$1.55 a ton. Compared to prices of last year, current prices are lower. Crushed boulders have risen in proportion and are now 10 cents higher, the former price of \$1.55 a ton, f. o. b. cars now stands at \$1.65 a ton, while material delivered on the job entails an additional charge of 40 cents a ton. A maintenance of the new prices it is announced may be expected for some time, with the exception of the extra charge for taking material from stock piles instead of gravel pits, a reduction which may be expected around the end of March or the first of April. Present quotations for cement are firm with no price reductions in sight. Including the barrel, cement is quoted at \$2.99 a barrel, which is 15 cents a barrel higher than last month. An extra cost of 15 cents per barrel is charged for delivery to the job.

Although current demands for building materials are heavy and each week brings new contracts under construction there is no shortage in this market of any of the basic materials. Material is reaching here in sizeable shipments sufficient to take care of the wants of contractors and dealers, from the outside as well as from local operations.

The Ohio Gravel Ballast Company is operating from storage pile mainly. Their Miamiville pit is the only activity under way. Mr. E. Zimmerman, the company's active manager states that at the latter pit, a new Marion drag line excavator has been installed. Handicapped the last year because of the small buying by railroads of ballast, Mr. Zimmerman and Mr. Donnelly of the company declare that the outlook in the ballast market due to the increased purchasing of the roads is the best in four years. The Ohio Ballast and Gravel Company is now shipping on old contracts although spring orders are beginning to become evident.

The Cincinnati Builders Supply Co., the largest supply house in this district, through L. G. Wilde, sales manager, announces that they have enjoyed a month of profitable business, the moderate weather having proven conducive to winter construction. Car difficulties have now been obviated, and general conditions of the railroads in this terminal according to Mr.



Wilde and traffice men, are the most efficient in the record of the last couple of years.

River Sand operations are moving at a regular pace. Business, according to Fred Hall, of The T. J. Hall Co., is fairly good, and present indications are that it will improve, if inquiries received in good numbers from architects, engineers and contractors materialize. The T. J. Hall Co. and The Ohio River Sand and Gravel Co., whose river diggings are local, have been handicapped by reason of the negligible amount of road building underway. Street work under normal conditions requires 150,000 tons of sand per year in this vicinity, and when the market is deprived of this amount of business, the river companies suffer, inasmuch as building construction consumes bank sand and very little of the river material.

H. H. Mueller of The John Mueller Co. announces that cement is coming in good quantities, and winter construction has created a good market for this material. The railroads are shipping from the Lehigh Valley district in fast time without difficulty.

"Many projects will be completed at once if we are not hindered with any more labor troubles," said H. W. Abbott, general manager of The Marion M. Allen Supply Company, in a review of conditions. "We expect to be busier this spring than we have been since the establishment of our business thirty years ago," he declared.

The Ohio River Sand Company, Louisville, Ky., has increased its capital from \$36,000 to \$300,000.

The past month witnessed the death of Walter S. McCammon, 61, president of the McCammon Bros. Company, building supply dealer, Cincinnati, after a lingering illness. Mr. McCammon was one of the oldest dealers in building supplies in Ohio, having conducted his present business since 1879. He was a member of the Masonic Lodge, Commandery of Knights Templars, a member of the Elks, and the Cincinnati Chamber of Commerce. He is survived by one sister, four nieces and nephews.

The Muskingum River Gravel Company, Beverly, Ohio, has been recently incorporated with a capital of \$20,000. Incorporators: W. S. Keever, H. F. Bauer, G. E. Bebout, R. H. Valentine and F. G. Valentine.

## Texas Notes

The Shepherd Sand and Gravel Company of Shepherd, Texas, has increased its capital stock from \$13,000 to \$40,000, installed additional equipment and has prepared to do a larger business.

The Fort Worth Sand and Gravel Company has recently been organized at Fort Worth, Texas, with capital stock of \$200,000. Incorporators are: R. M. Quikley, H. P. Bonner and J. C. Hart. The company will work gravel pits on the Trinity River near Fort Worth and will do a wholesale and retail business in sand and gravel.

The Turner Gravel Company of San Antonio, Texas, has recently been incorporated with a capital stock of \$50,000. Incorporators are: A. P. Turner, L. Hetlage and James Aiken. Shortly after organization, this company increased its capital stock to \$150,000.

The Grand River Sand and Gravel Company of Fort Gibson, Okla., has leased the bed of the Arkansas River from the Oklahoma School Land Commission and will work the river bed for sand and gravel to fill orders. This company has obtained the contract for supplying a large part of the sand and gravel used in the construction of the Spavinaw water project of the City of Tulsa, in which several hundred thousand cubic yards of each will be used.

The Texas Portland Cement Company of Dallas, Texas, has increased its capital stock from \$1,000,000 to \$2,000,000. It is explained by Henry C. Coke, secretary of the company, that the increase in capitalization is the conversion of the company's surplus into capital stock, and means that the company will put into use the large surplus that has been idle in the company treasury for the last year.

The Anderson Sand Co. of Montgomery, Ala., has been incorporated by Owen Anderson, with a capital of \$2,000.

Extensive improvements are being made in the plant of the Koury Calcium Company, Waco, Texas. The officers of this company are: B. F. Litsinger, president; C. P. Schafer, vice-president; J. P. Philips, vice-president, and W. V. Hanover, secretary-treasurer.

## Cement Plant News

### Preparations Being Made to Meet Demands of a Busy Season

Cement production in the Lehigh Valley district of Pennsylvania starts the season under most favorable conditions, and 1923 finds the different mills running at close to maximum—probably the heaviest output ever before prevailing at this season.

Despite the fact that road-building has practically ceased in Pennsylvania, New York, New Jersey, Maryland and Delaware for the time being, and which states call heavy on the local mills for their supply of cement, the wheels are humming for other accounts, not the least of these being for spring reserves. The stock houses, as previously stated in recent issues of PIT AND QUARRY, are virtually empty and there has been no opportunity in many months past to create an available stock. It is expected that substantial progress can be made in this direction during the next few weeks.

The labor situation shows no marked change, and a slight curtailment in yard work has made the immediate demand for men slacken. With repairs and improvements coming along, however, it is certain that good labor will continue in full assurance of ready jobs. The coal supply is fair and there is no immediate concern on this point; at the same time, the mills are looking ahead to insure a full quota for the weeks to come.

The Lehigh Portland Cement Co., Allentown, Pa., decided early in January to close its Mill F, at Coplay, for general repairs. The work will be rushed to completion, and shortly thereafter Mill D will be shut down temporarily for a like purpose. Both plants will resume at the earliest possible moment, as the company is in need of capacity production to handle its orders. Work is in active progress on the new mill now in course of construction at Tarrant City, near Birmingham, Ala., and the initial unit will be placed in service as soon as it is ready towards the latter part of the year.

The Alpha Portland Cement Co., Easton, Pa., is maintaining operations at its different mills in this section,

and expects to run throughout the winter period. The company has added to its string of plants by the purchase of the mill of the Continental Portland Cement Co., at Continental, St. Louis County, Mo., giving a consideration for the property of more than \$1,000,000. The present plant has a rated output of 3,200 barrels per day, and plans are in progress for the erection of additions to advance this capacity to 4,500 to 5,000 barrels daily. Considerable additional machinery will be installed, and improvements made in the present mill. The work is estimated to cost approximately \$500,000.

The Coplay Cement Mfg. Co., Coplay, is resuming production at its local plant, recently closed down for repair work, and it is expected to maintain operations for an indefinite period, giving employment to the regular working force. It is said that large orders have accumulated in recent weeks, with spring business looming big.

Other leading producers in the Lehigh Valley district are continuing under their regular production schedules, including the Atlas Portland Cement Co., at Northampton; the Nazareth Cement Co., Nazareth; the Whitehall Portland Cement Co., at Coplay; and the Bath Portland Cement Co., at Bath. Some of these mills contemplate a slowing-up for repairs to machinery, but no specific dates have as yet been announced.

The mill base in this section holds at the recently established \$2.10 a barrel level, without sacks, in carload lots. No change is looked for in this figure for the remainder of the winter, and the quotation is likely to hold well into the spring period. Mill prices in the different producing districts show a like inclination with the exception of the Universal Portland Cement Co. at Universal, Pa., where the quotation has declined to \$1.90. At Hudson, N. Y., a \$2.20 basis is well established, while a similar rate prevails at Leeds, Ala., and Fordwick, Va.; Buffington, Ind., is at \$1.80 a barrel, while Mitchell, Ind., holds to a \$2.05 figure, this being the plant of the Lehigh Portland Cement Co. The Northwestern States Portland Cement Co., at Mason City, Ia., is quoting a base of \$2.05.

The Department of Conservation and Development, Trenton, N. J., has issued an interesting report covering the production of cement in the state for the past six years. It shows that in



this period, the output has more than doubled in value, the figures for 1916 being \$2,534,628, as compared with \$5,566,000 in 1922. The production increase has not been as large as the valuation by any means, the total for 1916 being 2,592,302 barrels, and that for 1921, 2,840,699. There are four producers operating in New Jersey, these being the Edison Portland Cement Co., New Village; the Vulcanite Cement Co., Vulcanite; the Alpha Portland Cement Co., at Alpha; and the Eagle Cement Corporation, Metuchen.

The Knickerbocker Portland Cement Co., Hudson, N. Y., has work under way on additions to its local mill for increased production. A contract for retaining walls and foundations has been awarded to the Turner Construction Co., New York, and this work will be pushed to early completion. Superstructures and finishing work will be placed under way at an early date. Additional equipment will be installed.

The Bonner Portland Cement Co., Kansas City, Mo., has plans under way for extensions in its plant in the vicinity of Leavenworth, Kan., for considerable increase in capacity. The work will consist of a number of buildings, estimated to cost close to \$1,500,000, including machinery. It is expected to call for bids and proceed with the work at an early date.

The Dixie Portland Cement Co., Chattanooga, Tenn., is considering preliminary plans for the erection of a number of extensions to its plant, including the installation of considerable new machinery and operating equipment for large increase in production. An appropriation of \$200,000 has been approved by the Board of Directors for the expansion.

The Bessemer Limestone & Cement Co., Bessemer, near New Castle, Pa., has arranged for the resumption of operations at its plant, following a recent close down primarily for machinery and equipment repairs. The company has developed plans for considerable increased production at the cement mill, and expects to run under heavy output throughout the spring, and for an indefinite period. A full working force will be employed.

The New Egyptian Portland Cement Co., Ford Building, Detroit, Mich., has work under way on its proposed new plant at Port Huron, Mich. The dif-

ferent structures, formerly used as car shops, will be remodeled and improved for the mill. Plans are also being considered for the construction of additional buildings. It is expected to commence the equipment installation at an early date. The work is estimated to cost close to \$100,000, complete. John Gillespie is president.

Samuel W. Kendall, Meridian, Miss., is organizing a new company to construct and operate a cement manufacturing plant in the vicinity of Sheffield, Ala., near Nitrate Plant No. 1 of the Government. The company is capitalized at \$5,000,000. A tract of land has been purchased, heretofore known as the "Kelley Quarry," as a site for the new plant, comprising extensive cement rock and lime stone deposits. The new mill will consist of a single unit for initial service, with a similar additional unit to be erected at a later date. Each unit will have a capacity of approximately 2,000 barrels of cement per day. A power plant, machine shop and other miscellaneous buildings will be built. A lime plant will supplement the cement manufacturing works, to consist of a single large kiln and auxiliary equipment, which latter will be supplemented with other kilns. The two plants are estimated to cost approximately \$1,000,000 with machinery, and will give employment to a full working force of close to 1,000 men. It is expected to commence work on the lime plant at an early date and have the installation ready for service in the summer. The cement mill unit will be completed early in the fall. W. T. Archer, president of the Muscle Shoals Real Estate Board, Sheffield, is also interested in the project.

The Co-operative Sand and Gravel Co., Los Angeles, Cal., has been incorporated with a capital of \$100,000.

The City of Milwaukee has purchased ten thousand barrels of cement from the Western Lime & Cement Co., at \$2.80 per barrel, an increase of 46 cents over last year's price.

Owners of trucks that haul sand and gravel in Glendale, Cal., have come before the city council with the complaint that they were being discriminated against. The tax on sand and gravel truck men amounted this year to \$40, while all other trucks are permitted to go untaxed.



## Where Railroad Cars Go After Gravel

### Paducah Company Loads Cars on the Dredge

The Paducah Sand & Gravel Corporation of Paducah, Kentucky, operate on the Ohio and Tennessee Rivers the steamer dredge "Sanderson" which, according to Mr. W. C. Sanderson, president and general manager of the company, has a daily capacity of 50 cars. The "Sanderson" employs some operating principles considerably different from most of the dredging that is done in that or any other part of the country. The plan is, according to the operators, an entirely successful one and is giving them a good deal of satisfaction.

Sand and gravel is pumped up from the river bottoms by a 10-inch Erie pump with 48-inch runners. The material is elevated to screens which separate at  $\frac{3}{8}$ ,  $\frac{1}{4}$  and  $2\frac{1}{2}$ -inch. The finest material is then passed to a home-made settling device, in the shape of a cone which employs baffles and the tendency of the material to settle, thus getting the coarser product to the bottom of the cone, from where it may be drawn off. From this apparatus the finer materials go to an Allen cone which accomplishes the separation of the finer sands. According to company records, two men are able to load 5 cars in 50 minutes, or one car in 10 minutes.

The gravel is secured in the Tennessee River and the sand in the Ohio River, the steamer working which ever is needed at the time. The gravel deposit runs about 75 or 80 per cent

gravel and the sand deposit 70 per cent sand.

The company handles considerable business on both sides of the Ohio River. The loading plan, as will be seen in the photographs, consists of bringing cars on to the steamer itself, as is done in the case of ferry-boats. Car loading facilities are provided so that the "Sanderson" can take on cars when the river is at almost any stage.

## How Chain Is Made

The S. G. Taylor Chain Company of Chicago call attention to the fact that they were established in 1873 and are now completing their fiftieth year in the manufacture of high grade steam shovel and dredge chain. Their article is known generally among the trade as Taylor Mesaba steam shovel chain and Taylor dredge chain.

In order that the consumer may have an idea as to what a high grade chain consists of and how it is manufactured, they have just issued a new catalog with photographs in detail and upon request will gladly mail copy.

## Blast Hole Drills

The Armstrong Mfg. Company, Box 59, Waterloo, Iowa, has issued Bulletin No. 81, devoted to an illustrated description of its New No. 50 all steel blast hole drill, which was recently placed on the market.

This machine, according to the company, is a complete unit of steel, including the derrick, and can be furnished with either four cylinder gasoline engine, or electric motor, at buyer's option.

The bulletin contains complete details, and will be gladly sent free upon application, to anyone interested.



## Say it with Agstone

### Association is Busy Boosting This Material for Agriculture

The National Agstone Association held a general meeting at Fort Pitt Hotel, Pittsburgh, Monday, February 12. Chairman King and President Lamkin alternated in presiding over the forenoon and afternoon sessions and the noon-day luncheon.

The following firms indicated in writing their desire to become members:

Kittanning Limestone Co., Kittanning, Pa. (Chas. E. Meals).

Limestone Products Corp. of America, Newton, N. J. (Edw. S. Bixler).

New Castle Lime & Stone Co., New Castle, Pa. (Ellwood Gilbert).

E. J. Lavin & Co., Philadelphia, Pa. (C. F. Kline).

Prof. White of State College, Pa., was a high-spot in this meeting. For many years he has preached the gospel of limestone and lime. He said State College had made a survey of soil conditions which indicated an absolute need of 1,500,000 tons of agstone per year in Pennsylvania, and that less than one-fifth of this amount was now used. This startling statement aroused the interest of all present.

Prof. White further said that the use of limestone and lime had brought the state of Pennsylvania from sixteenth place, as an agricultural state, up to seventh place in the Union. He further stated that Pennsylvania offered great opportunities for honest co-operative promotion and agstone salesmanship. He said he would attend Harrisburg meeting, but would be impartial as between raw limestone and burned lime.

Plans of general advertising and promoting the sale of agricultural limestone were discussed.

Mr. Bixler made a forceful talk on salesmanship. Pennsylvania agstone producers were enthusiastic in their desire to co-operate in broadcasting the virtues of agstone.

President Lamkin and Chairman King outlined the need and advantages of co-operation and made appeal to all producers who sold agstone in Pennsylvania to join in an advertising and promotional campaign.

The chairman stated that the fol-

lowing firms had made application at the Chicago meeting for membership:

Templeton Limestone Company, Templeton, Pa.

Dolomite Products Co., Rochester, N. Y.

A. N. Spencer, Columbia, Mo.

Texas Stone Products Co., Dallas, Texas.

National Mortar & Supply Co., Pittsburgh, Pa.

Bemis Bag Co., Peoria, Ill. (Associate member).

At the suggestion of Pennsylvania producers, Mr. Bixler of New Jersey, and Prof. White of State College, Pa., an agreement was reached to hold a general meeting at Harrisburg, Tuesday, March 6, Penn-Harris Hotel, 9:30 A.M., to discuss soil conditions, advertising and promotion campaign for Pennsylvania, Maryland, Delaware, New Jersey and New York.

The board of directors will meet the previous day at the Hollenden Hotel, Cleveland.

## Lime Plants And Dryers

The McGann Manufacturing Company, Inc., is a new corporation which will engage in the manufacture of York lime kilns, both shaft and vertical types, and York dryers, both single and double shell.

Robert G. McGann, Chicago, president of the new company, was formerly president of the Ruggles-Coles Engineering Company, Chicago and New York. Wm. J. Kuntz, vice-president and general manager of the new company, was formerly treasurer and general manager of the Steacy-Schmidt Manufacturing Company, York, Pa., and also of the Ruggles-Coles Engineering Company.

The plant consists of an up-to-date pattern shop, foundry, machine shop and plate shop, and besides the specialties mentioned above will also manufacture complete lime and hydrating plants, sugar machinery, tanks, castings and special machinery from engineers' designs.

The International Cement Corp., of New York City, has purchased the Bonner Portland Cement Company's plant at Bonner Springs, Kans., for \$600,000. The Bonner Springs plant was built in 1908 and employs 165 men and has a capacity of 1,500 barrels of cement daily.

## Progress In Chain Drives For Cement Mills

Superintendents and operating men in cement mills and other locations where abrasives are present, will be interested in improved drive chains now available. No. 103 Ewart Link-Belt has for years been one of the standard drive sizes for cement mills. At first this chain was used with ordinary gray iron sprockets. These wheels were not wholly satisfactory, as they cut rather rapidly under the severe conditions. Thus the first step came as an improvement in the sprocket wheels. To overcome the rapid wear, flint-rim sprocket wheels have been very largely adopted. These wheels are very much harder than the ordinary gray iron sprockets, maintain their outline and pitch, therefore, much longer, and not only prolong their own life but prolong the life of the chains.

Increase in the loads imposed upon drives, increases the wearing tendencies, and in severe cases has demanded greater strength. Ewart type chain cast in manganese steel has been used with some success. Manganese steel links are considerably more expensive than malleable iron links, and do not correct the operating conditions.

A great advance has been made by the Link-Belt Company in Link-Belt No. SS-40, an all-steel bushed roller

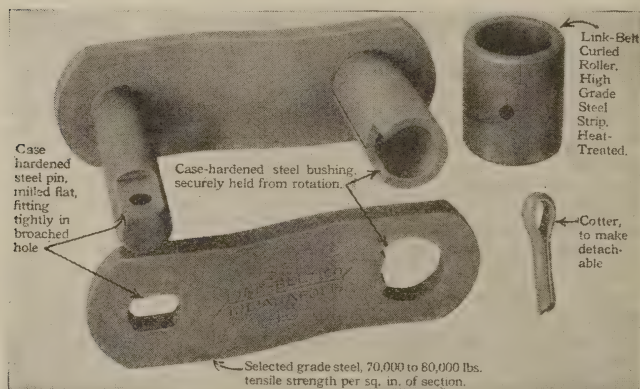
chain, which operates on the standard No. 103 sprocket wheels. One mill superintendent who had a troublesome drive reported that he put on a new malleable iron chain about every month. When he changed to manganese, the chain would last about two months, but when he substituted No. SS-40, the drive was good for at least two years.

No. SS-40 has close-fitting but freely-revolving rollers. This eliminates the rubbing of the chain going on and off the teeth and rims of the wheels, greatly reducing the friction and wear (which is unavoidable with links cast solid). In the presence of abrasive material, which gets between the sprocket wheel and the chain, rollers are especially needed, because the chain with rollers comes to a seat on the sprocket without any sliding action.

No. SS-40 chain has rolled steel side bars, made exactly to pitch, case-hardened smooth finished pins, and case-hardened smooth bushings securely held in the side bars, making smooth, close-fitting joints, with hard long-wearing surfaces.

The latest improvement is the adoption on the No. SS-40 chain, of the famous Link-Belt curled roller, which has been successfully used for a long time on the higher priced, high speed roller chains, such as are used on trucks, tractors, etc. The rolled steel strip used to make the curled roller, is of a special grade, refinement, and analysis of metal. Every process of its manufacture develops a fibrous instead of a granular structure. The fiber of the metal runs around the roller, which gives

it great strength and resiliency, and resistance to shock. The break in the metal circle eliminates internal strains, and presents an opportunity for slight spring, which cushions the shocks and materially increases the life of the chain. The rollers are very accurately made, and finished to such close clearances, that gritty dirt does not work into the joints.

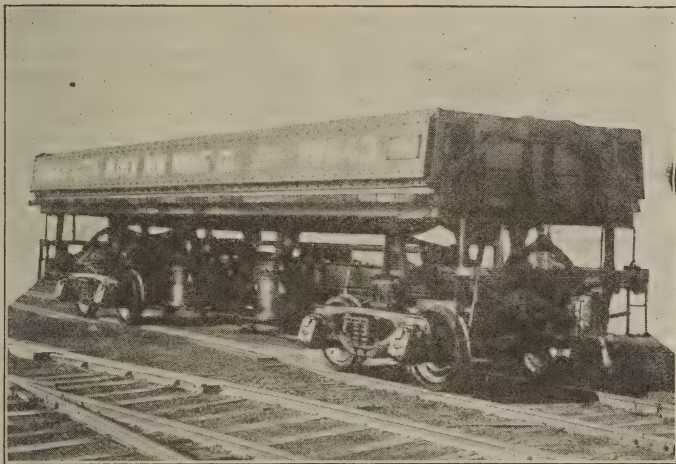


Parts of Link-Belt No. SS-40 Chain link.



**Western**

# The Western—That's Why



Does it mean anything that after a rigid field test lasting several years the largest operator on the Messabe Iron Range has ordered 100 large size Western dump cars—a repeat order at that?

All Western dump cars, ranging in size from 1 cubic yard to 30 cubic yards capacity, have the same general design; all have the same standard of excellence; all will out-work and outlast any other make of dump car of equal size.

The 6-yard Western Standard gauge dump car is the favorite for pit and quarry work but there is a Western dump car suited to every job.

What is your haulage problem? Perhaps we could help. Send for our illustrated booklet describing many pit and quarry installations.

## **Western Wheeled Scraper Co.**

*Earth and Stone Handling Machinery*

**Aurora, Illinois**

## Slag Producers Elect

**Pittsburgh, Birmingham and  
Cleveland Represented in Of-  
ficial Roster**

At the fifth annual meeting of the National Slag Association, which was held at the Hollenden Hotel in Cleveland, Ohio, Feb. 16th, the following officers were elected for 1923:

President: C. L. McKenzie, Duquesne Slag Product Company, Pittsburgh, Pa.

Vice President: C. E. Ireland, Birmingham Slag Company, Birmingham, Ala.

Secretary-Treasurer: H. J. Love, 933 Leader Building, Cleveland, O.

A. T. Goldbeck, chief of the division of tests of the U. S. Bureau of Roads, who was present at the afternoon session, discussed with the producers the elaborate test procedure of the complete investigation of the properties of slag as an aggregate in concrete, which his organization has practically completed. The work was begun in 1919. In all probability the results will appear as a paper before the American Society for Testing Materials in June of this year.

Approximately 85 per cent of the tonnage of commercialized blast furnace slag is represented by the membership of the association.

## Electric And Gasoline Hoists

This illustration shows one popular type of Mundy double drum electric hoist, and is taken from a revised catalog recently issued by the J. S. Mundy Hoisting Engine Company, Newark, N. J.

This hoist illustrated is provided with two friction drums, each drum being fitted with ratchet and pawl, with band brakes and automatic brake, which holds the load in case of failure of the electrical current. This style of hoist is suitable for derrick work, one drum being used for hoisting and the other for raising or lower-

ing the boom. It may also be used to operate a clam shell bucket.

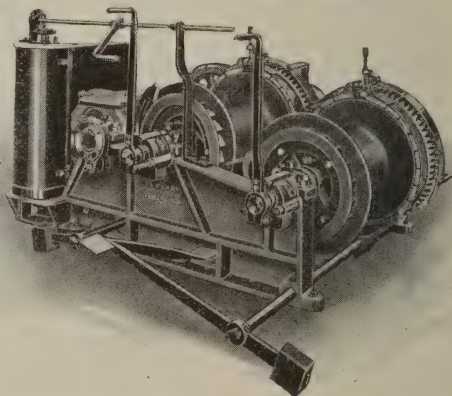
The catalog shows a number of other types in both electric and gasoline.

## For Canadian Business

The Webster Manufacturing Company of Chicago, Ill., and Tiffin, Ohio, announces further expansion in connection with the Canadian business. A new corporation has been arranged, the Webster-Inglis Limited, 14 Strachan Avenue, Toronto. The facilities of this plant will enable the new organization to design and manufacture high grade elevating, conveying and power transmission machinery, along the same lines as now manufactured by the Webster Manufacturing Company.

Mr. Fred A. Ballin, president of the Monolith Portland Cement Co., of Los Angeles, California, is making an inspection tour of the largest cement plants in the east. While in the east, Mr. Ballin plans to purchase a few locomotives and extra railway cars. The new rolling stock will be used at the plant of the company at Monolith, Calif.

The Beaver Portland Cement Co., Portland, Oregon, is planning extensive developments in Josephine County which will cost approximately \$1,500,000. This will include the erection of a cement plant at Grants Pass, Oregon, and the building of three miles of standard gauge railroad. This railroad will open up a practically unlimited supply of 98 per cent pure calcium carbonate, which will be used in the manufacture of cement.

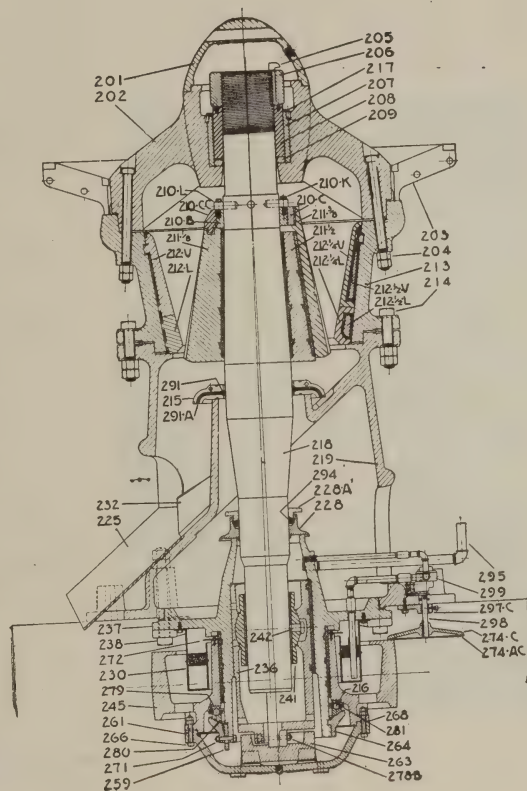




# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.



Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

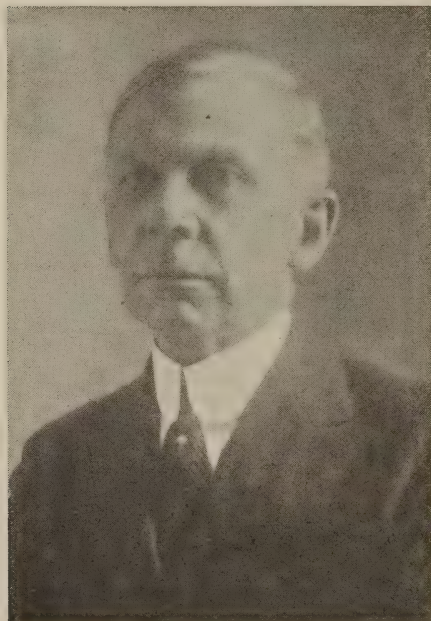
**KENNEDY VAN SAUN MFG. & ENGR. CORP.**  
**120 Broadway** **NEW YORK**

**CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS**

## New Taylor-Wharton President

At a special meeting Percival Chrystie was recently elected to the office of president of the Taylor-Wharton Iron & Steel Company, High Bridge, New Jersey, to succeed the late Knox Taylor. Mr. Chrystie was formerly vice-president and has been acting president since Mr. Taylor's death.

Mr. Chrystie was born in High Bridge, New Jersey. He attended the local school and also the Leal school of Plainfield, New Jersey. He started



Percival Chrystie

to work for the company as office boy during his school vacations. Going into the shops, he progressed through various departments until he became inspector. Then he went into the sales end and introduced the use of manganese steel in the anthracite coal regions of Pennsylvania. Returning to the plant, he worked up to be superintendent of the steel foundry, then secretary and treasurer and finally vice-president, a position he held for many years. His selection as president comes as a well deserved recognition of ability after over thirty years, service for the company and will receive

the hearty approval of the employees and stockholders.

Mr. Chrystie is a member of the New Jersey State Board of Conservation and Development, a director of the First National Bank of High Bridge, director of the Delaware & Bound Brook Railroad, member of the American Iron & Steel Institute, American Institute of Mining & Metallurgical Engineers, the Engineer's Club of New York, the Railroad Club of New York and the Manufacturers' Club of Philadelphia.

At the same meeting of the board, Samuel M. Buck of High Bridge, was elected a director of the Taylor-Wharton Iron & Steel Company to fill the unexpired term of Knox Taylor. Mr. Buck is Works Manager of the High Bridge plant and of the William Wharton Jr. & Company plant at Easton, Pa. and was chosen to represent the employee stock holders.

The Jackson Gravel Company, Jackson, Mich., has been incorporated with a capital of \$10,000.

C. J. Curtin, C. J. Curtin, Jr., of New York City and T. J. Curtin of Cheshire, Mass., have bought the plant of the Berkshire Glass Sand Company, at Cheshire.

The Tell City Sand and Gravel Company, Tell City, Ind., has been incorporated with a capital of \$40,000. The directors are, E. T. Slider, O. G. Reilley, Walter Slider, Charles Herr and Lee Herr.

H. G. Horton of the explosives department of the du Pont Company has been named as Western representative of the contractors' division of that department with headquarters in the McCormick Building, Chicago.

The New River Sand and Gravel Co., Huntington, W. Va., has been incorporated with a capital of \$50,000. Arnold Irwin and Fred Pike, Huntington; R. T. Thrift, Charleston; J. E. Armstrong and Tracey Burges, Barboursville.

A contract has been awarded to the Colorado Portland Cement Co., Denver, Colo., by the secretary of the interior, to supply 10,000 barrels of cement for use on the Riverton irrigation project in Wyoming. The amount of the contract is \$34,000.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lim

Vol. 7

CHICAGO, ILL., APRIL, 1923

No. 7

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*Loading sand with a  
Barber-Greene Conveyor*

*Loading chert direct from bank to  
truck with a Barber-Greene Loader*

## Saving 66% Overhead and 25 Men on Chert

In Lewis County, Tennessee, the Moore Construction Company, of Nashville, saves 25 men with one Barber-Greene Loader used for loading chert—or gravel—direct from bank to trucks.

They say, however, that they consider this saving a rather minor merit. Their real saving comes in a reduction of their overhead costs per yard. Their records per 10,000 yards show that with the loader the material is handled in just one-third of the time consumed with hand-labor methods.

"And with our overhead," says Mr. Carr, job superintendent and partner, "that means a lot more to us than the labor pay-roll."

Because of the performance of this machine two other companies in adjacent counties have adopted the same methods.

In California, the Oakland Building Material Company reports that in one eight-hour day their Barber-Greene loaded 105 four-yard truckloads—and when one of the trucks became mired the Barber-Greene was run in and pushed the truck out. They say, however, that they believe this to be only a beginning in making the most of the eight-hour day.

Hundreds of other users report similar gains—as against other mechanical equipment and against hand methods.

We will be glad to mail on request our catalog N, together with cost reports covering the experience of other users.

**Barber-Greene Co., 490 W. Park Ave., Aurora, Ill.**

*Representatives in Thirty-three Cities*

**BARBER**  **GREENE**  
Portable Belt Conveyors Self Feeding Bucket Loaders



# Pit *and* Quarry

Vol. 7

Chicago, Ill., April, 1923

No. 7

## Visiting Operations

THE editors of this journal, in their travels, have found a very large number of pit and quarry operators are following the practice, during the dull season, or at other times of the year, when it is convenient for them to leave their own business, to visit operations similar to their own, to study and learn of improved methods and of the most modern machinery adapted to their work. This is a practice that is to be commended, and every operator should spend some time and money in doing this.

There are many advantages to be gained by pursuing this course. One of the bad features of American business is the hard grind that most men have, to keep their business to the top notch. This continual application is the price of success; yet on the other hand it causes a man to become stale, just as an athlete does from over-training, with the result that he is not able to do his best at all times. Thus the business man who stays on the job, from one year's end to the other, is not as keen in his work as he should be, makes errors of judgment, and loses that broad perspective that he should have, with the result that he does not make all the profits that he should.

This is especially so in producing pit and quarry products. One authority on this subject states that these products are classed as low grade commodities; that is, the margin of product is unusually small, and as dividend producers they cannot be attractive unless every cent is saved in

their production, and the output per day is fairly large. With these statements being considered as true, it is evident that pit and quarry operators should always be at their best, and that they should handle their proposition so that not a cent is wasted, and their production for any stated period should be as large as possible, really exceeding their sales, so as to make it necessary to augment them.

A few short trips made during the year, or one longer trip, will go a long way towards resting up a business man. It will sharpen his wits, improve his business ideas by meeting other successful business men, and broaden his vision, besides giving him a much needed vacation, and some recreation. Besides these things, an operator who is visiting plants in other sections of the country will learn many things that he could not learn at home, or through books and journals.

PIT AND QUARRY would recommend to every operator that during the coming year, he take some time to visit plants that are producing products similar to his own. It is needless to comment further on the advantages to be gained by this procedure, but it may be well to give a word of warning as to jumping to conclusions and making erroneous deductions from things that are seen on such trips.

It is advisable to see plants in actual operation, rather than when they are idle. By doing so, operations can be watched and a good method picked from the bad, while the merits of machines as well as their demerits can be seen.

## Setting the Pace for the Job

**I**N EVERY pit and quarry operation, it is necessary to have a pace maker for the job if real economy is to be practiced. An operation without a pace maker means slow work and an irregular output.

In many cases there are pace makers, yet little attention is paid to them, which is a great mistake.

What should be the pace maker? This must depend upon the kind of a layout at each plant, and a hard and fast rule cannot be laid down.

If a stone crushing quarry is operated by using a cableway for transporting the stone from the breast of the ledge to the crusher, then the stone crushed must depend upon the service rendered by the cableway. This must be made the pace maker of this operation, and every endeavor must be made to keep the cableway working to its greatest capacity.

The same thing is true about a gravel or sand washing plant that is fed by a belt conveyor or a slack line cableway. These must be made the pace makers.

On the other hand if plants are fed by trucks or cars, then the pace makers should be the crusher or washers. If the crusher has a greater capacity than the amount of rock that can be delivered by two trains, then additional trains should be used; or if one steam shovel is not able to furnish stone to keep the crusher going, another shovel should be installed. In other words if the crusher has a capacity of a thousand tons per day every effort should be put forth to make it produce that tonnage instead of being satisfied with half that amount, especially if the full capacity can be sold. It can be seen that the crusher should set the pace and all the work at the ledge and the transportation facilities should be co-ordinated to the work of the crusher.

The same thing is true of a screen-

ing or washing plant for sand and gravel. If these things are not done then there is little use of having such a large size crusher unless it is used alone for breaking up boulders, that is of saving money in breaking large boulders. Even this though would make boulder breaking expensive.

A pace maker means to increase the output of the product, and cut down not only the operating costs in most cases, but also the overhead charges on each unit of material produced. This will add to the profit made on each unit of the output and by this and the increased sales nothing is more money made but the profits will accumulate quicker.

## Value of a Minute

**A** READER calls attention to the article under the above caption in the September issue of PIT AND QUARRY, commending the article, yet stating that it is incomplete without some comment upon the time lost by breakdowns of machinery and the value of a minute in preventing such breakdowns and making the necessary repairs.

This suggestion coming from a reader is of value. However, the writer of the previous article thought that all concerned would understand these things, but a few comments may be of value.

In looking over the advertisements in this journal it is quite surprising the number of "ads" that bear directly upon this subject. One caption reads, "Fewer Trouble Hours per Year." Another says, "Blank Performance Scores Again." A third caption is, "The Value of Time." Another ad states, "The durability and performance of your equipment determines the speed of production and the amount of your profits."

This presents the matter in a nutshell. No matter how rapidly a ma-



chine can be operated, if it is poorly built so there are frequent breakdowns the output of the machine is materially reduced, and no matter how many time studies have been made in order to save minutes or fractions of minutes, such studies are in vain. This is true no matter what kind of a machine is being used. A truck may be able to travel 120 miles in a 10 hour day, but if it is being repaired for half the day and makes but 60 miles, the service is not equal to a truck making but 9 miles an hour, yet keeps going throughout the week without being repaired.

Thus to realize the value of minutes and obtain the proper returns from each minute when machinery is being operated, the first consideration must be dependable machines. Then the saving of minutes and seconds can engage the attention of the operator in working the machinery as outlined in the previous article.

One advertiser aptly expresses the entire subject in saying:

"PERFORMANCE—long continued service under the most severe conditions have proven our machines to be dependable."

This is the test of time, and means service; this is the value of a minute in machine operation, followed by service and time studies in actual operation. But all machines must be co-ordinated. A steam shovel in a quarry may be dependable, but if the cars serving it are continually out of order, the shovel will be idle most of the time. The cars must be as dependable as the shovel.

The plant of the Wilkinson Sand Corp., located near Wedron, Illinois, are spending \$25,000 on new machinery and equipment, including a steam shovel and steam locomotive. The shovel will have a capacity of 35 cars of sand a day. Mr. C. W. Wilkinson, who is president and treasurer of the company, has offices in the Moloney Bldg., Wedron, Ill.

## Time Clocks

IN ANY operation as a quarry or sand and gravel pit, when the work is scattered over a large area of ground, it is difficult to know when men report for work and also if they leave before the proper time. Without a check on this, men soon learn that they can report for work late without being found out and they can likewise slip away half an hour or more before the noon hour or in the evening.

There is but one method of overcoming these conditions and that is by use of a time clock. A timekeeper can by careful watching prevent many omissions, errors and stealing of time, but it is not possible for a timekeeper to be on hand for every minute in the day, but a timekeeper and a time clock can be on hand to protect the employer against paying for time and work he does not receive.

With a time clock a card is made out for each employe for every day and on this the clock punches or marks the time of coming to work and leaving, and this can be done not only morning and evening but if necessary can punch the time card in and out at noon.

By the use of these cards the minute of coming and going is recorded, and with such a record and the help of a timekeeper to see the men while at work, it is hardly possible for men to steal much time.

From the time cards the payroll is made up. The time clock also furnishes an official timepiece for the job, and prevents men from using their own timepieces, which may be wrong. Likewise it is not possible for foremen to stand in with men and rob the employer of time or pad the payroll with men who are not working.

There are so many advantages of time clocks over the ordinary methods of keeping time, that the clocks soon pay for themselves.

# Rock Loading at Lime-Plant Quarries

By OLIVER BOWLES.

Mineral Technologist, U. S. Bureau of Mines

REMOVING fragments of broken rock from the quarry floor and placing them in cars for transportation to the kilns is a very important quarry process. At most lime plants rock-loading constitutes the largest single item of quarry cost. In view of the great expense involved in loading, a consideration of the relative merits of different methods followed, and the conditions under which each method may be most advantageously employed are worthy of more than ordinary attention.

Hand loading of rock fragments is conducted at practically all small lime plants and at many large ones. While the wide application of the method may be due partly to reluctance of operators to depart from methods long in use, its employment by many progressive companies suggests inherent advantages that merit careful scrutiny.

An undoubted advantage to small operators with limited capital is the small outlay required for loading equipment. This consists of trackage, cars and ordinary hand tools such as pick, shovel, sledge and fork.

A second advantage is the opportunity it affords for selection of suitable material. Personal observation of every fragment permits the rejection of siliceous or otherwise impure masses. The hand loader is enabled also to reject all small-sized stone together with any clay or sand that may have been blasted down with the rock. Such undesirable materials are loaded on separate cars and removed either to a screening plant for recovery of the best stone, or to the waste heap.

A third advantage which is of exceptional importance in the lime industry is the ability of the hand loader to

maintain a minimum of fine materials. In modern lime burning in shaft kilns very little rock smaller than 4-inch is acceptable, for it retards the draft. While all exceptionally large rock masses encountered in loading are blasted in block holes, masses of medium size are sledged to fragments not exceeding 10 to 12 inches across. The skilful sledger will break the rock into the desired sizes and produce only a very small amount of fine material. The mechanical breaker such as the jaw or gyratory crusher will subject the rock to much rougher treatment and thus produce more fines.

A fourth advantage in hand loading is the small delay to following operations that results from failure of loading equipment. Where loading is accomplished by one large machine, breakage of some essential part will cut off production entirely, while a steady flow of rock from a number of independent units insures more continuous operation.

The tonnage of rock handled per man employed is much lower when hand loading is followed than where mechanical equipment such as the steam shovel is employed. Therefore, a large gang of hand loaders is required to obtain the necessary output for a large lime plant. This is a decided disadvantage at times when labor is scarce or when wages are high.

In loading waste materials the advantage is more definitely on the side of the steam shovel. Where hand methods are employed the loading of dirt and rock chips is slower than the loading of kiln stone. Commonly the contract price of loading dirt is 2 or 3 cents per ton higher than the price paid for loading good stone. The



Mr. Bowles Would Like Answers  
to These Questions from Operators

1. Do you prefer hand loading in your quarry and why?
2. Do you prefer steam shovel loading in your quarry and why?
3. What are your hand loading costs per ton?
4. What are your steam shovel loading costs per ton?
5. What items are included in steam shovel costs?
6. What information on loading could you supply in addition to that presented in this paper?

Address Mr. Oliver Bowles, care of PIT AND QUARRY, or direct to  
Bureau of Mines, Washington, D. C.

steam shovel, on the other hand, loads dirt with greater facility than it loads stone.

Steam shovels are very widely used for rock loading at quarries, but in the production of stone for lime burning this type of loading equipment is used less extensively than in most other branches of the stone industry. The main reason for this condition is the necessity for sorting of stone according to both size and quality. As the steam shovel lacks the ability to thus select its materials, crushing and screening equipment must be added, and this involves so heavy a first cost that many operators prefer to use hand methods.

The extent of the operation should govern the size of the shovel. For an output of 150 to 300 tons of rock per day small tractor shovels with  $\frac{3}{4}$  to  $1\frac{1}{4}$  yard dippers are suitable. Caterpillar tractors offer special facilities for rapid moving, or for working on a soft bottom. For larger operations heavier shovels should be used. It is not economical to use either too small or too large a machine. Where the shovel is small in proportion to the size of following equipment many blocks too large for the shovel to handle must be blasted even though sufficiently small to be readily crushed. This results in unnecessary blasting expense and waste of time. On the other hand, if a large shovel is

used for a limited output the operating cost is excessive.

Where hand loading is followed all rock masses must be broken at least to "one-man" size. The steam shovel, however, can handle rocks of several hundred pounds or even in excess of a ton in weight. If the primary blast breaks up the rock moderately well very little secondary blasting may be required, whereas in hand loading much secondary blasting, as well as a great deal of laborious hand sledging are necessary.

For equal tonnage produced a much smaller gang of men is required with a steam shovel than for hand loading. Figures were compiled by the Bureau of Mines a few years ago for tonnage of rock per man loaded at cement-plant quarries. At 14 quarries where steam shovels were used an average daily output of 112 tons per man was obtained. In this estimate pit men and shovel men only were taken into account. For 11 quarries where hand loading was employed the daily tonnage per man, loaders only, was 16. This indicates that about 7 times as much rock per man can be loaded with steam shovels as can be done by hand. The possibility of greatly reducing the number of workers by substituting machines has an important bearing on many problems that confront the operator. In some instances the maintenance of a large output with a great-

ly reduced staff has for various reasons quite distinct from the actual cost, constituted the deciding factor in the introduction of mechanical loading.

The ability of the steam shovel to load rock of all sizes from chips to masses over a ton in weight is a great advantage in so far as the actual loading process is considered, but it necessitates additional work at later stages. For lime burning the rock must be in sizes approximately between 4 and 10 inches, and thus it is necessary to have crushing and screening equipment when steam shovel loading is followed. Any operator therefore who plans to add a steam shovel to his quarry equipment, and who has no crushing plant, must face the additional expense for machinery to break and size the rock.

A further limitation of the mechanical loader is its inability to sort material according to quality. If flint, iron stain, or other undesirable impurities are scattered irregularly throughout the rock mass, the steam shovel loads them with the good rock. Lime manufactured from stone from which such impurities are not separated is of lower quality than that manufactured from hand picked stone. A steam shovel operating in rock of fluctuating quality tends, therefore, to degrade the final product.

A steam shovel together with the necessary crushing and screening equipment requires a heavy investment which may not be justified for a small plant, though it may be a profitable investment for a larger operation. For small to moderate-sized plants with limited capital it may be more economical to follow hand loading methods.

In any attempt to compare the cost of steam shovel and hand loading, consideration must not be confined to the mere loading processes. The secondary blasting cost is higher for hand

loading than for shovel work. On the other hand a steam shovel loads a mixed product from masses weighing tons to fine chips and dirt, while hand loaded rock is broken to size and separated from the fines. A hand sledge is a poor substitute for a rock crusher, and sizing of rock by hand picking is less efficient than mechanical screening, nevertheless, they serve the purpose in a degree, and part at least of a crushing and screening cost must be added to the steam shovel loading cost in order to make a fair comparison between the methods.

The cost of hand loading is easy to determine for it is done almost entirely by contract. The contract price in eastern United States during 1922, varied from 18 to 23 cents per ton. To this must be added the expense for tools such as picks, shovels and forks. The cost of steam shovel loading involves other and more complex factors. To the wages of shovel operators and pitmen must be added the necessary expense for fuel, oil, repairs, interest on investment and amortization (a proportion of the value set aside each year sufficient to replace the shovel with a new one when it becomes no longer serviceable). As noted above in comparing the cost with that of hand loading, part of the crushing and screening expense should be added to the cost of steam-shovel loading and a deduction made to compensate for the reduced blasting expense where the shovel is used. When the direct cost of steam shovel loading is considered it may appear to be very much lower than the cost of hand loading, but when all factors are taken into account the difference is not so great. However, for open-pit work on a large scale it is probable that mechanical loading is considerably cheaper than hand loading.

A more definite report on costs



could be prepared if operators would submit to the Bureau itemized cost data of steam shovel loading.

Small blasts on shallow benches are unsatisfactory for steam shovel loading, for a succession of small supplies of rock involve great loss of time in moving the shovel and placing tracks. Heavy blasts that throw down large volumes of stone are better suited for economical steam shovel operation. Furthermore the blast should not throw the rock down in a thin sheet, for this again not only necessitates frequent moves, but the shovel dipper is filled with difficulty when it works against a small resistance.

Adjustment of the charge to break the rock properly is of course a prime necessity. Insufficient shattering results in great loss of time in shifting masses of rock to one side for secondary blasting.

As the steam shovel lacks the ability to sort materials, a clean product can not be produced if the overburden is only partly removed. The loading of mixed rock and soil is justified only where equipment for subsequent separation is provided. Screens may give a clean separation in dry weather, but a mixture of clay and rock is more difficult to handle in rainy seasons. If, through the presence of seams or clay-filled pockets, it is impossible to remove the overburden entirely, a washing equipment may assist greatly in promoting successful operations of the steam shovel.

The great advantage of the steam shovel is its ability to load many tons of rock per hour, but this advantage is largely nullified in many quarries through delays in waiting for cars. Tracks should be so arranged that empties may be placed, and loaded cars removed with the smallest possible loss of time. There should also be an adequate supply of cars, so that small delays at the crusher will not suspend loading through shortage of empties.

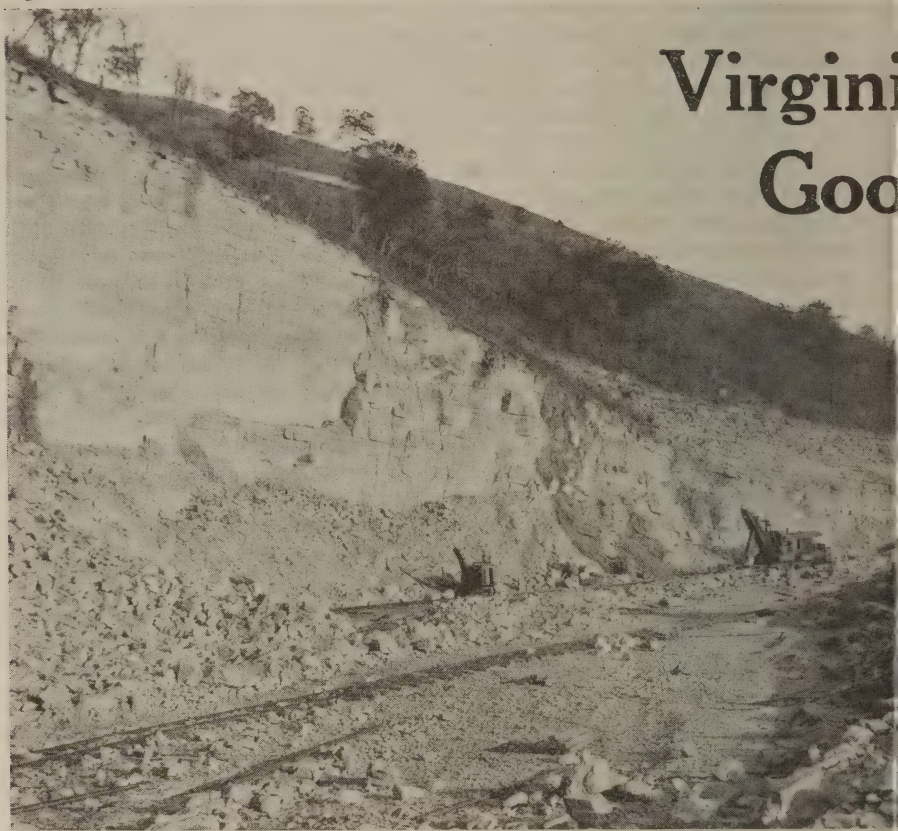
The efficiency of a steam shovel depends largely on the skill of the shovel runner. An experienced operator can load rock rapidly, and can use the dipper to move cars or to set aside large masses of rock for subsequent blasting. Care and good judgment are necessary qualifications. The ability to judge properly the size and dimensions of blocks are invaluable qualifications of a shovel runner, for the loading of over-sized fragments may greatly hamper operations through delay at the crusher. So prevalent are delays from this cause that a fixed rule is maintained at some quarries requiring all rock loaded to pass through the dipper.

## Labor and Wage Conditions

OPERATORS are facing a situation in which there is some scarcity of labor already apparent and in which they may expect to write up a higher figure of cost for productive labor. Wages are higher. The increase varies in different sections of the country, but practically everywhere there are reports of wage advances and of still further demands.

It is a situation making for thoughtful attention to the matter of power-driven labor saving equipment and devices, especially for handling material. There are two good reasons for investing in new equipment of this kind at the present time. One is the scarcity of help, and the other is the higher cost. Back of these, too, is the natural and logical progress in invention and development of mechanical devices to do the work of man.

So, whatever may happen in the future in the way of changes, the situation at present is one favorable to the investment in labor saving devices so as to carry on and serve the needs of the trade and at the same time hold down the cost of operations to a minimum and be so far as practicable independent of labor supply and wage demands.



# Virginia Good

A company that has for years controlled many stone crushing plants would be expected, on the acquisition of a new plant, to know enough about stone crushing to make of the latest addition to the group a pretty efficient operation. Sometimes, perhaps, it doesn't work out quite this way, but in the case of the Virginian Limestone Corporation it did. This organization, which controls some 15 plants, made of their newest operation at Klotz, Virginia, one that is ahead of all their others in efficiency and economy of operation. The new plant reflects all the experience accumulated during the years in which the guiding spirits of the company have been engaged in the business of producing crushed stone.

They have a real plant at Klotz, a little way station near Ripplemead, some 60 miles southwest of Roanoke. And they are making that plant better

right along, the betterments coming in the nature of additions to the screening, washing, crushing and shipping facilities. At the time of the writer's visit, for example, a whole new washing plant was under construction and preparations were being made to build an aerial cableway across the New river to a loading plant on the other side, which will give the company shipping facilities on the Norfolk and Western Railroad, as well as on the Virginian Railroad.

The men who are doing this work are well known to stone producers in another section of the country. Mr. Charles A. Klotz, president of the Virginian Limestone Corporation, has been prominently identified for many years with the crushed stone industry of the middle west, and has operated quite a number of plants in and around Chicago, as has also Mr. G. W. Lenzie, vice-president of the Virginian Cor-



# Limestone Plant Makes Use of Fine Stone



poration. Mr. J. Allen McGraw, general manager, and Mr. W. B. Bobbitt, superintendent, have also spent considerable time in the Chicago district. Mr. Bobbitt was at one time superintendent of the Ives quarry at Racine, Wisconsin, described in a recent number of PIT AND QUARRY.

The holdings of the company at the Virginian location include 700 acres of dolomitic limestone, a complete crushing and screening plant, a washing plant, power plant, loading station fed by an aerial cableway, machine shops, and quarters for the people employed at the plant. Quarry development has been going on now for about five years, and an adequate working face has been exposed, although the possibilities of the quarry location cannot be realized until the face has been worked further back to permit of slightly different blasting methods.

The stone has characteristics that

make it a desirable material for concrete work, for ballasting, for fluxing and for the manufacture of agricultural stone. The Government physical test, made by A. G. Goldbeck, engineer of tests, showed that the material has a

|                             |        |
|-----------------------------|--------|
| Per cent of wear .....      | 3.00   |
| Hardness .....              | 15.30  |
| Toughness .....             | 11.00  |
| Weight per cubic foot.....  | 175.00 |
| Per cent of absorption..... | 0.24   |

The chemical analysis made by Froehling & Robertson of Richmond, Virginia, showed:

|                           |               |
|---------------------------|---------------|
| Moisture .....            | 0.31 per cent |
| Silica .....              | 8.00 " "      |
| Iron and Alumina .....    | 2.88 " "      |
| Calcium Carbonate .....   | 51.81 " "     |
| Magnesium Carbonate ..... | 36.49 " "     |

99.49 per cent

As encountered in the quarry, the stone is seamy and for this reason, not the easiest of materials to drill

and blast efficiently. Before the company adopted its present blasting methods it experimented with a variety of plans and found that the undoubted merits of all these methods did not apply in this particular case—for example, the well known economies that usually come with the use of well drills and sprung holes, were not realized when these practices were employed at Klotz. Loading with dynamite is done more lightly than in most places and the location of drill holes is calculated rather more carefully. The most satisfactory results appear to have been gained through the use of tripod drills and the shooting of powder from unsprung holes. The lesson was learned after there had been a number of unsatisfactory blasts which left after them ragged quarry faces.

The first work of the quarry, that of stripping, is accomplished hydraulically. Water is pumped from the New river by a heavy duty Worthington duplex, compound, reciprocating pump, to a tank at a high point on the property. From this tank it is taken up by an Advance pump which gives a nozzle pressure of 150 pounds and insures the removal of all dirt and clay. The Virginian company has an ideal location for a stripping operation. There is plenty of water and, although it has to be elevated and piped quite a distance, this water is procured at a comparatively small cost. There is also an easy means of disposing of the spoil in the river itself. The stone is scoured off clean. All dirt and clay is removed from the quarry surface and taken out from spaces between the vertical joints where, in a number of cases, it is present in large quantities. The careful stripping methods insure the quarrying of clean stone which will not impose too great a burden on the washing facilities of the plant.

As already stated, drilling is done with tripod air drills. Ingersoll-Rand DDR13 drills are employed. The stone is shot down to the floor from which it is loaded by a Class 80 Atlantic type steam shovel, weighing 120 tons and equipped with a  $3\frac{1}{2}$  yard bucket.

A description of a clever kink that saves the company a great deal on its drill sharpening and considerably expedites this work will be found on another page of this issue of PIT AND QUARRY. Producers with old shovels

that will serve no useful purpose may learn something from it.

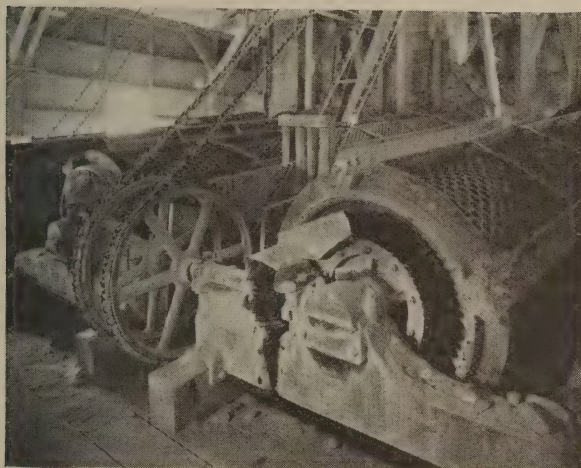
The next operation, that of conveying the stone from the shovel to the plant is handled in a way rather different from any of the standard methods. A Woodford automatic electric haulage system is installed at this plant and takes care of the work of carrying stone between the shovel and the crusher. Electrically operated cars of 15 tons capacity each, controlled from a central tower at the plant, are run up to the shovel and back to the crusher at the will of the operator. Cars can be stopped and started at any point in the quarry. Power is distributed through "third rails." Each car is a motor car and is operated independently of locomotives. The operator's station is located at a point where he can at all times command a full view of the entire quarry. The cars dump at a point below and directly in front of the control tower.

The dumping is also by automatic action. As the cars go up to the crusher, they engage with the mechanism shown in a number of the illustrations. This automatic dumper, a part of the Woodford system, is also under the control of the operator.

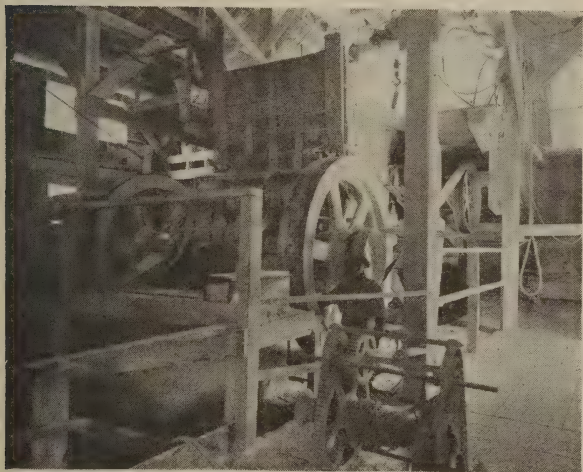
Cars dump at the side into a hopper at the bottom of which is a Stephens Adamson apron feeder, 60 inches wide and  $16\frac{1}{2}$  feet between centers. This feeder is of cast steel and has bosses which engage the pieces of stone as the feeder moves forward. The device serves the purpose of balancing plant and quarry operations. It feeds just enough stone to keep the primary breaker busy, taking its supply from the hopper which can contain large or small lots of stone. Thus, quarry operations can fluctuate considerably without either choking the crusher or allowing it to run out of stone. This apron feeder is just the same width as the crusher, thus making certain that stones of the right size will be passed ahead. An Ingersoll-Rand air hoist is also installed at this point. It runs on rails above the crusher and can be made to serve a variety of purposes.

The primary breaking machine is a 48x60 inch Power & Mining jaw crusher. This piece of equipment reduces stone from 8 to 10 inches. Through this 4x5 foot opening, fed by the apron feeder described above, go the largest stones taken up by the





48 Inch by 24 Foot Revolving Screens Located in the Upper Screen House



Note the Roomy Space Around the Primary Jaw Crusher



American Locomotive Used for Switching Cars

shovel. As shown in one of the illustrations this crusher is installed in a way that allows plenty of room all round it in which to make repairs and adjustments. In fact, it is a feature of this plant that plenty of room is given in all parts to permit of easy repairs. It is very emphatically not a sardine can plant, yet is sufficiently compact so that material is not conveyed over too great distances.

From the jaw crusher the stone, which runs from 8 to 10 inches, drops to a stationary screen with  $3\frac{1}{2}$  inch openings, the whole screen set at an angle of 45 degrees. This device serves as a grizzly and makes a separation of material at a little over 3 inches. From this point on, the product passing the grizzly and that which is rejected, go different ways. The material that is under 3 inches and which contains all the dirt that came from the quarry is passed to the washing plant. The material above 3 inches goes through the regular crushing and screening process for manufacture into commercial sizes that do not require washing.

The first machines through which go rejections from the grizzly are two No.  $7\frac{1}{2}$  Gates type K gyratory crushers. The products of these crushers

drop through to the boot of a No. 9 elevator, 75 feet between centers which carries it to two 48 inch x 24 foot revolving screens. The screens and elevator, as well as the two No.  $7\frac{1}{2}$  crushers are products of the Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin. Each of the revolving screens used at this plant is ordinarily fitted with four sections of  $1\frac{1}{2}$  inch perforations, two sections of  $2\frac{1}{4}$  inch perforations, and a jacket with  $1\frac{1}{2}$  inch perforations. Thus are secured two

sizes which go direct to bins, together with the product of the jacket and the rejections from the screen. These rejections are dropped back by gravity to a No. 6 Gates and a No. 5 McCully gyratory crusher located at the level of the No. 7½ crushers. These two machines reduce stone at about 2 inches. The stone is then taken up by a Stephens-Adamson 20 inch pan conveyor with 35 foot centers, which carries it to a No. 6 Allis-Chalmers elevator. This elevator passes the stone to another 48 inch by 24 foot Allis Chalmers revolving screen with 4 sections of 1 inch perforations, 2 sections of 1½ inch perforations and a jacket with ½ inch perforations. The product of this screen includes stone from 1½ inch to 1 inch, from 1 inch to ½ inch, from ½ inch to ¼ inch, together with ground limestone that would pass 36 mesh, and the tailings from the screen itself.

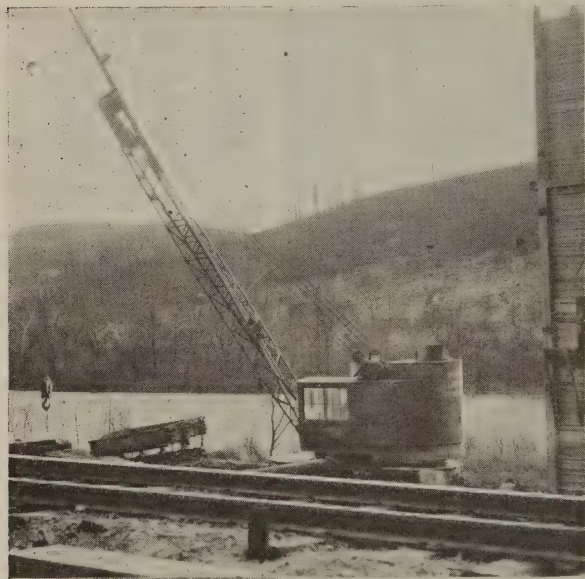
These tailings are dropped down to a 24 inch Stephens-Adamson pan conveyor, 20 feet between centers, which discharges at two No. 4 Gates crushers. The product of these No. 4's drops to a small 20 inch pan conveyor that fed the No. 6 elevator before mentioned. In other words, the rejections from the two 48 inch re-

volving screens first encountered in the process, are reduced as described and the tailings from this second reduction process are passed again through the process itself.

The ground limestone from the 48 inch by 24 foot revolving screen used for the tailings of the second revolving screen, is chuted to 2 double deck Universal Vibrating screens made by the Universal Vibrating Screen Company of Racine, Wisconsin. These screens are equipped with 3x3 and 6x6 mesh cloth, which yield a product that is more important in this than in most plants, as well as described later.

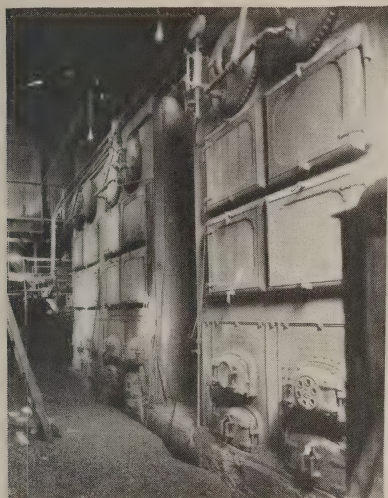
Reverting again to that early part of the process in which is given a description of the manner in which the grizzly screen separates at 3½ inch, we find that it is still necessary to describe the course of the material passed by the grizzly, together with what dirt may have entered the process from the quarry. This material passed by the grizzly is drawn off by a 24 inch belt conveyor, 30 feet between centers, which carries the stone to the boot of a No. 6 elevator, 75 feet between centers. This elevator discharges at a 48 inch by 24 foot Allis-Chalmers revolving screen similar to the other three screens used

in the regular crushing plant. This screen drops its rejections, which run over 2 inches, back to a No. 5 gyratory. The material passed by the screens, all under 2 inch, is taken up by a 24 inch belt conveyor to the washing plant. A number of the illustrations show the way in which this conveyor connects the crushing and washing plants. At the time the plant was visited, work was going ahead on the steel gallery in which this belt is to run, and which will also house another belt, one which will carry material intended for stock piling. The method of stock piling and of transporting material across the river by aerial cableway will be described later. By this time the washing plant is in operation, and the construction work on the

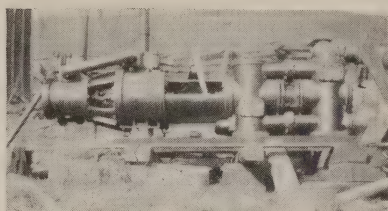


25 Ton McMyler-Interstate Crane Used for the Stock Piling System





Note Trough for Carrying Ashes to River



One of The Pumps Used in The Hydraulic Operation

Some More Views  
around the  
Virginian Limestone  
Corporation  
Plant at Klotz, Va.



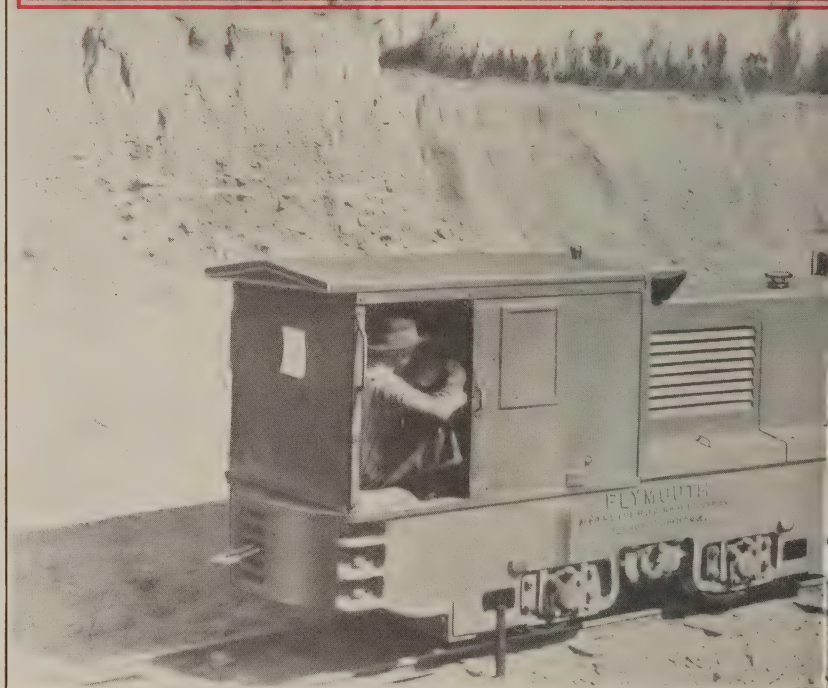
At Left—Loading  
Rock into Woodford  
Cars

Below—West End of  
Quarry



# PLYMOUTH

## *Gasoline Locomotive*



*Plymouth Gasoline Locomotive, B...*

## **Plymouth Locomotive Displaces Mul and Electric Hoist**

Every day money is being lost by the continued use of slow and expensive haulage methods.

Suddenly a light dawns. A better haulage method is installed. Man power is displaced. Infinitely more material is delivered, and the saving astonishes.

Read the letter in the panel adjacent. If, in your opinion, your haulage method is slow and expensive, ask us for literature and give us the opportunity of discussion and suggestion.

**THE FATE-ROOT-HEATH CO.**  
Plymouth, Ohio





*Parker Material Co., San Diego, Calif.*

## **This Letter Tells of Daily Saving**

San Diego, Calif.

Fate-Root-Heath Co.,  
Plymouth, Ohio.  
Gentlemen:

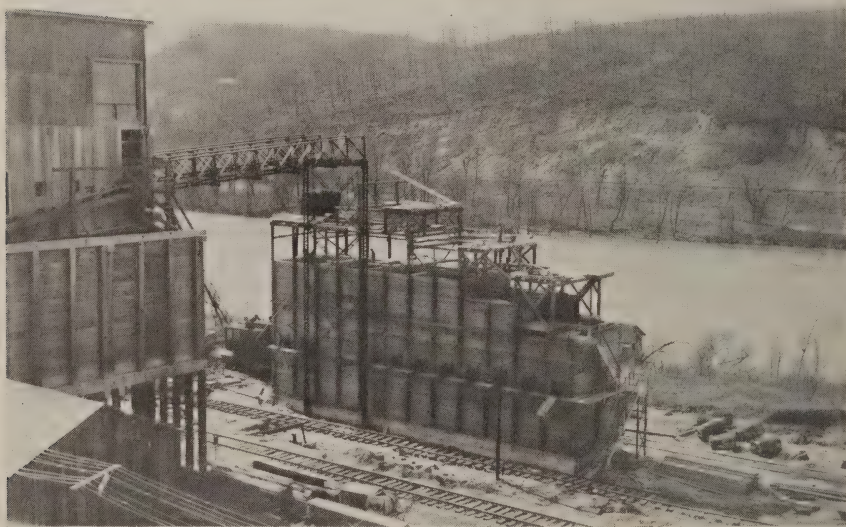
Prior to installing your 6-ton PLYMOUTH Locomotive, we were hauling our tram cars with mules and electric hoists, a slow operation. The PLYMOUTH has eliminated both of these processes, and is getting more material to the plant on account of its speed and power, and at greatly reduced cost.

Its low cost of maintenance and simplicity of operation makes the PLYMOUTH a very desirable unit for any work of this nature.

Sincerely yours,  
FENTON-PARKER MATERIAL CO.,  
By Geo. S. Parker, V. Pres.



View of Virginian Plant from Loading Side. Picture Taken Before Washing Plant  
Was Built



View of Washing Plant in Process of Construction at Time Picture Was Taken



cableway has progressed to a considerable degree.

Material intended for the washing plant and carried to that plant by a 24 inch belt conveyor, is discharged in a 48 inch by 14 foot special Stephens-Adamson scrubbing screen. The screening section is equipped with  $\frac{1}{2}$  inch perforations. Water is introduced at this point to the scrubbing section of the screen. All the stone that passes  $\frac{1}{2}$  inch is dropped to a special Stephens-Adamson all steel sand washing and settling tank. Water overflow from this tank is sent back by flumes to the river, from which it is secured in the first place by 2 Allis-Chalmers turbine driven pumps with a capacity of 1200 gallons of water each per minute.

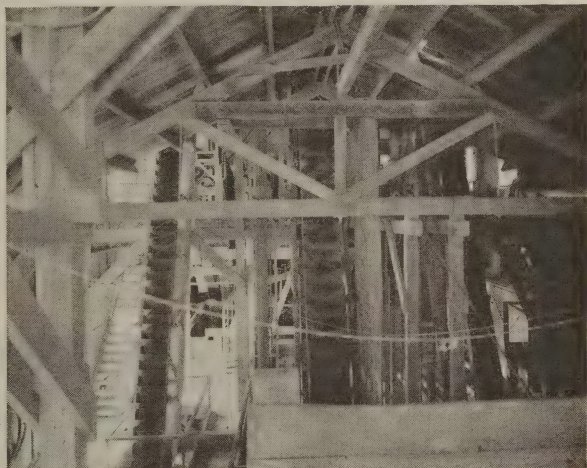
As stated, the material that is passed to the pashing tank is 2 inch size and under. The material is thoroughly cleaned and dewatered in this tank and then chuted to bins. Rejections from the screens are passed through six 54x72 inch Gilbert screens and then on to the Stephens-Adamson washing tank. As shown in one of the illustrations, the Gilbert screens will be located in pairs above each of the bin compartments, and will be mounted at successively lower levels in the direction in which the material is traveling. The screens over the first of these bin sections are equipped with  $1\frac{1}{8}$  inch perforations, over the second with  $\frac{9}{16}$  inch perforations and over the third with  $\frac{1}{4}$  inch perforations. The second settling tank is located over another compartment to which its product passes, the overflow water running to the same flume that carries the overflow from the first tank back to the river.

This means that there are in the washing plant compartments for 5 sizes, one compartment for each of the washing tanks and for each pair of Gilbert

screens, in the three sizes described above. In addition to these bin compartments, there is a compartment into which discharges the conveyor that brings forward material for the piling system.

Piling is handled by a 25 ton McMyler-Interstate crane, equipped with a  $1\frac{1}{2}$  yard clamshell bucket. Piling space is provided for 100,000 yards of material. This material will be handled both in and out of storage by the McMyler crane.

Each of the bins in the washing plant just described has 4 bin gates, 2 on either side of each bin. All loading will be done from the sides of the plant, along which run railroad loading tracks.



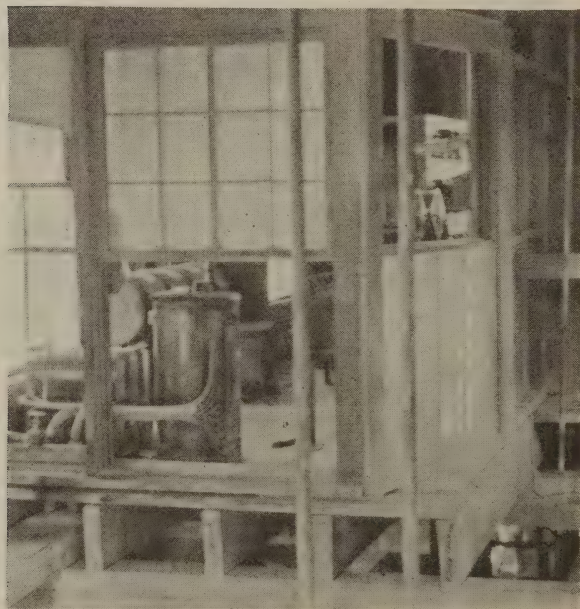
View of Elevators Taking Product to Upper Screen House



The Nozzle at Work Removing Overburden from Quarry



Cars of Stone Are Dumped by an Electrical Device Under the Control of the Quarry Car Operator



Quarry Car Operator's Tower Commands a View of All Parts of the Quarry

The washing plant is a substantial structure 9 feet long, 22 feet wide and 66 feet high. It is of wooden construction and is built on heavy concrete foundations.

The idea of the aerial cableway which is to carry material across the New river, is that it will give the company loading facilities on two railroad tracks instead of one. At this point the Norfolk and Western Railroad and the Virginian Railroad run parallel, one on either side of the river. The plant is on the Virginia side and the new cableway will permit the company to enjoy all the advantages of the Norfolk and Western. This cableway has a capacity of 5,800 yards per day over a span of 1,200 feet. It was made by the Interstate Equipment Corporation of New York City.



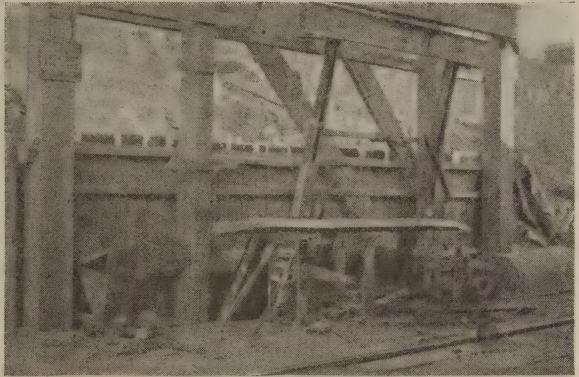
The regular crushing plant is equipped with 3 special Caldwell screw conveyors. These conveyors are located under the loading tracks of the crushing plant, and higher than the loading track running by the washing plant. One of these special screw conveyors is so arranged that any mixture that a contractor may desire from dust to 2 inch stone can be made. In fact this particular conveyor is installed for the definite purpose of making a special concrete stone mixture for which there is a large demand.

The other two conveyors are used for the purpose of piling ground limestone. It is necessary to handle this material in enclosed screw conveyors because of the fact that the fineness of the material would cause it to be blown away, if it were brought out into the open on a belt conveyor.

The power used at the plant is steam generated from three 350 H. P. B. & W. water tube boilers. These furnish steam for a 700 H. P. cross-compound engine, which passes on its power to the plant through a rope drive. A 250 k.w. General Electric generator is used to generate the electricity used around the plant for the haulage system, for the illumination of the plant and quarters, and for a number of other purposes. From the boilers are also driven a straight line Sullivan compressor of 1000 cubic feet capacity and a Type 10 Ingersoll-Rand compressor of 1000 cubic feet capacity. A pipe line is also run from the boilers out to the river to furnish power for the two 6 inch turbine driven pumps for the washing operation.

Examination of the illustration which includes the boilers will show a trough cut in the concrete firing floor, parallel with the boiler fronts and just outside the firing doors. Into this trough are dropped all of the ashes drawn from the ash pits. A stream of water running through carries away the ashes to the river. Surely a simple ash disposal method.

The Virginian Corporation has voted itself out of a lot of trouble by the installation of a 100 ton Fairbanks track scale that automatically weighs cars



Device for Dumping Electric Quarry Cars Controlled by Car System Operator

of stone which, when loaded, drop down by gravity from the plant. The scale is in charge of an agent of the Virginian Railway Company, who records the weights and issues to the stone company receipts for the tonnages that he has checked. The scale is tested frequently and many of the disagreeable arguments about weight that occur so frequently at some plants are never found here.

The Virginian Limestone Corporation is on the grow. During the last year they have practically doubled the capacity of their plant and quarry, and are able to give considerably improved service with the piling system and the new cableway across the river. The plant which began a few years ago as a ballast production operation for the Virginian Railroad is now turning out commercial stone in all required sizes. As it stands today, with all the additional units that have been added since the first work was done, the company has a plant of which it can well be proud.

The production of limestone sand accounts for a considerable part of the plant's output. The company has been interested for many years in the production of this material at other points, and is pushing its sale more rapidly than the average crushed stone producer. The use of limestone sand in considerable quantities began years ago in Chicago when new city ordinances compelled the elevation of all railroads entering the city, and consequently necessitating the building of about 300 miles of concrete retaining walls. The question of having

limestone sand specified in the work came up for discussion, and the engineers of the railroads, unfamiliar with the use of this material, had extensive laboratory tests made. Mr. E. H. Lee, engineer for the Chicago and Western Indiana Railway, and the Belt Railway of Chicago, was selected to make the tests, as a result of which the use of limestone sand (screenings) was permitted in the construction of the retaining walls for the track elevating work done by the railroads in Chicago. More than 80 per cent of these walls were constructed of concrete in which limestone sand was used.

At that time the owners of the Virginian Limestone Corporation were extensively engaged in the production of crushed stone for the Chicago market and were consequently greatly interested in the new standing acquired by limestone sand. They got into the business on a quite large scale and

sold a great deal of material. When they came to build the plant in Virginia, they investigated fully the possibilities for production of limestone sand from the material they were to quarry. Tests showed that a grade of limestone sand much better than the Chicago product can be produced in Virginia. Limestone quarried by the Virginian Limestone Corporation is of higher grade than that quarried in the vicinity of Chicago. It is much harder and the limestone sand is a great deal sharper. Engineers to whom samples of both products have been submitted, are agreed that the Virginia product is far superior to that manufactured in Chicago. Since the Chicago product has come into such demand, the officials of the Virginian Limestone Corporation believe that limestone sand produced in Virginia has even a better future before it than that made in Chicago.

## Progress on Signal Mountain Cement Plant

The first unit of the \$3,000,000 plant of the Signal Mountain Portland Cement Company now being erected at the foot of Signal Mountain near Chattanooga, will be placed in operation during the month of June, weather conditions permitting the continuance of normal construction schedules, according to announcement made recently by Col. Clarence Steward, vice-president and acting head of the institution. Forces will be doubled and work carried on 24 hours a day.

The first unit of the 5,000 barrel plant will have a daily capacity of 1,250 barrels. Attempt will be made to put the second unit in operation a month or two later, after the first one is in running order. Over \$1,000,000 has already been expended on the plant.

The Signal Mountain Portland Cement Company, which promises to become a leading Southern industry, was organized under the laws of the state of Delaware and was later domesticated in the state of Tennessee. The officers of the new enterprise are John L. Senior, president; J. P. Hoskins, treasurer; Ralph Law, secretary, and W. A. Sadd, Chairman of the Board of Directors. The actual work of build-

ing the plant is in the hands of Mr. B. R. Alford, superintendent of construction.

The location of the new plant is about five miles from Chattanooga. There is a mile of waterfront along the Tennessee river, from which point the company's land slopes upward and lies along the mountainside. The location is regarded as fortunate not only because of the proximity of the necessary raw materials and of the contour of the property, which permits very satisfactory utilization of gravity, but also because of the economic value of transportation facilities available to employees. The Chattanooga Traction Company runs a line through the property, and the homes, schools, churches and theatres of Chattanooga are easily accessible. This feature eliminates the necessity for building employee quarters and makes possible a saving of approximately \$200,000.

Chattanooga was selected as a good location for the manufacture and distribution of cement for a number of reasons. Chief among these is the growing demand for the product in the territory served and the comparatively small production facilities. Of the 115 cement plants operating in the United



States, only about 15 are located in that group of states which comprise the section of the south, southeast and southwest. These plants produce not much more than 10 per cent of the cement manufactured in the whole country.

Markets are assured all over the projected distribution area. The new enterprise is surrounded by prosperous states in which the demand is continuously growing. The completion of the Wilson dam at Florence, Alabama, will permit shipment of a considerable part of the output by water over a large territory. Other parts are served by good rail connections.

The mill is being constructed along modern and approved lines. The management contemplates the erection of a very fine plant and is spending money to bring this about. No new cement plants have been put in operation in this section for the past 10 years, although most have been modernized by additions and alterations. Aside from the new enterprises going ahead in Birmingham, the Signal Mountain plant will enjoy the distinction of being the only one for a considerable distance around built from the beginning along modern lines.

The plant is located on the Dixie Highway, which intersects the entire length of the property. For the avoidance of possible accidents a tunnel will be built under the road for the transportation of plant products and raw materials. Thus good traffic to the city is assured in all seasons. The fact that the plant is within the shipping district of Chattanooga will give access to all the principal railroads of the south. The Tennessee river will afford water supply for the site chosen as well as river transportation for coal and finished products.

The limestone quarry is located 1800 feet west of the plant, and includes 100 acres of limestone that runs 400 to 500 feet down and is expected to last 75 years. The stone above ground level has a slope of about 5 degrees west. The operating face to start with will be 800 feet long by 30 feet high. This can be increased to 2000 feet by 175 feet high. Overburden is negligible and will not impose any added cost on the quarry operation. The drilling plan has not been decided upon as yet, although it is known that electric well drills and jack hammers will be employed. Loading will be done with a Bucyrus shovel with  $3\frac{1}{2}$  yard

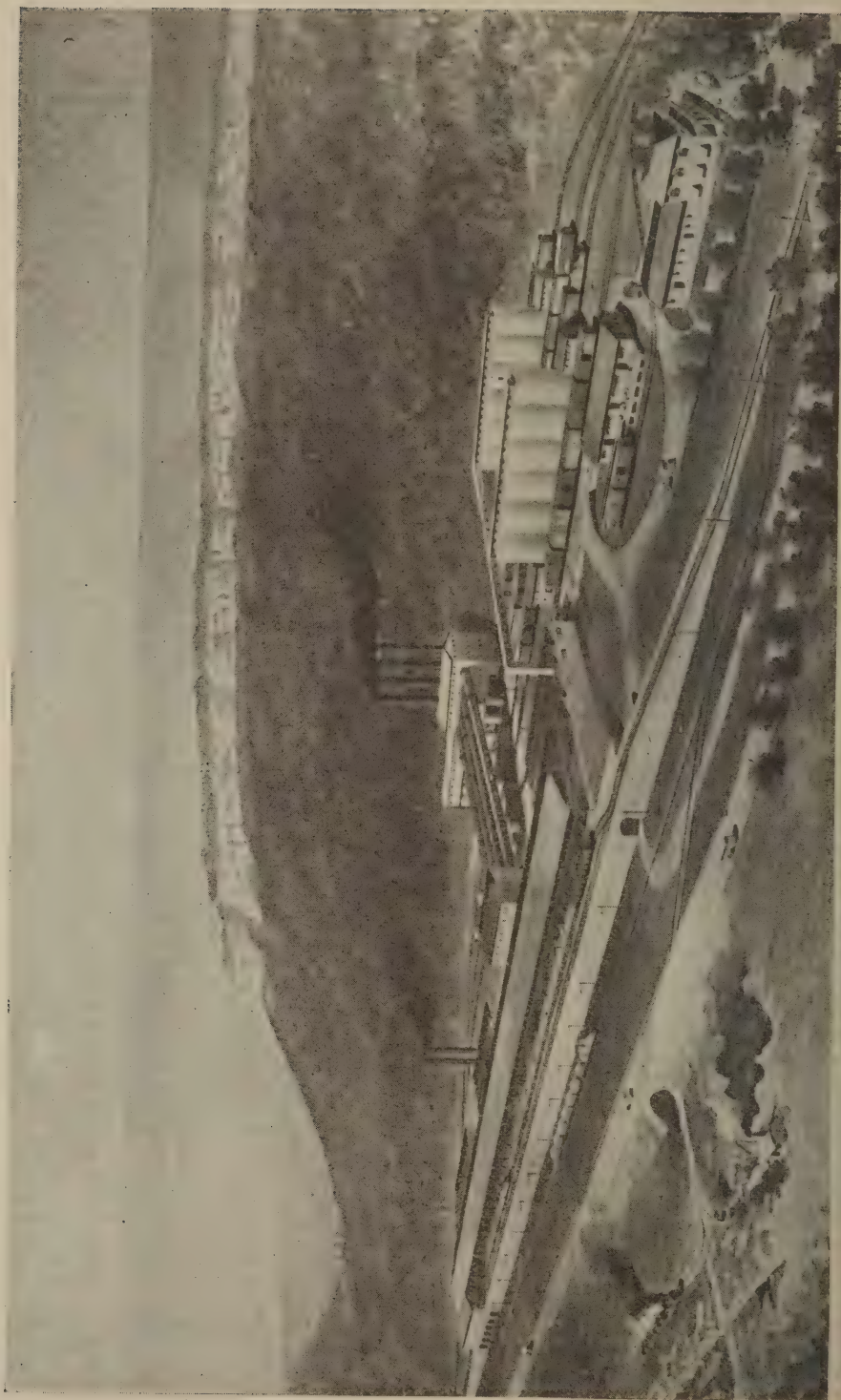
bucket, dumping into Western air side dump cars. Haulage to the plant will be accomplished by a 50-ton Baldwin locomotive, switch type. The clay field, as shown in one of the sketches herewith, is located just across the Dixie Highway from the plant. The deposit includes 75 acres of clay running to a depth of 25 feet. The occurrence is in a solid bed that requires no stripping. Loading will be done by an Erie type B shovel into Western air side dump cars.

Limestone brought to the plant by the means described will be taken up on a trestle leading to the crushing plant. The cars will be dumped by air into a hopper above a No. 21 Allis Chalmers gyratory crusher. This machine will reduce stone to 8 inch size, after which it will be picked up by an elevator and passed to steel storage tanks. A traveling grizzly will carry this product to two Jumbo mills, which will reduce to  $1\frac{1}{2}$  inches. The material running through the Jumbos will be plus 2 inch minus 8 inch. The Jumbo crushers are located above the primary crusher and their product passes through it to the raw rock storage. These Jumbo crushers, products of the Williams Patent Crusher and Pulverizer Co., of St. Louis, Mo., have a capacity of 300 tons per hour of 8 inch stone and will reduce it to  $1\frac{1}{2}$  inch and finer in one operation.

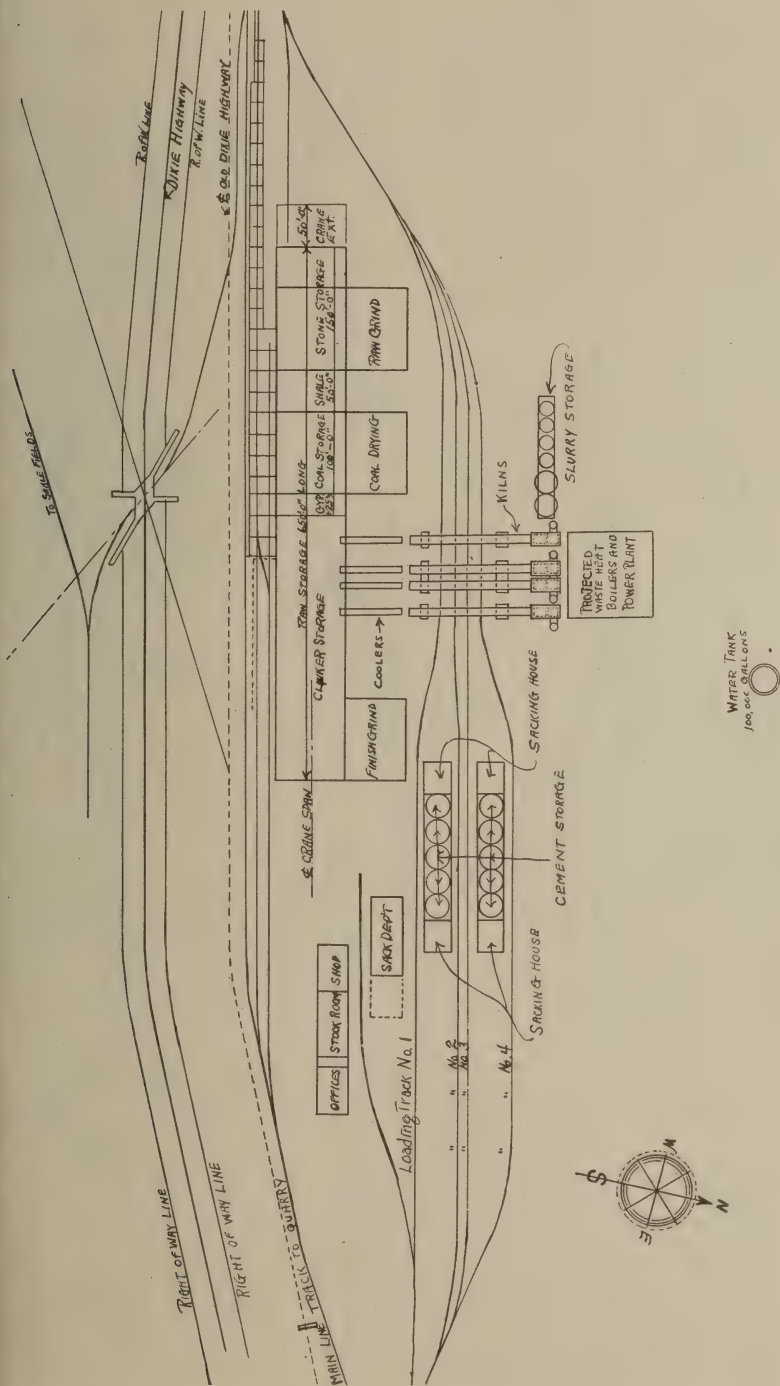
In the same building that serves for storage of raw limestone space is provided for storing clay. This material is brought up in Western side dumping cars of 12 cubic yards capacity each. These cars are dumped by air. The clay is then passed to an Allis-Chalmers 26 foot American wash mill in which it is thoroughly washed and passed with limestone rock into the wet grinding mills. The transportation of the material from the raw storage to the wash mills and raw grinding mills is accomplished by Shepard  $2\frac{1}{2}$  yard electric overhead travelling cranes of 80 foot span.

The work of the raw grinding department is handled by four Allis-Chalmers 7x22 foot compeb wet mills. These compebs receive their supply of stone from bins through Allis-Chalmers style H feeders. The clay is introduced through specially designed feeders.

The raw storage is designed to accommodate 15,000 tons of crushed stone, 5,000 tons of clay, 2,500 tons of gypsum and 5,000 tons of coal.











Under the same roof is the clinker storage, designed to hold 150,000 barrels of clinker.

After the limey and clayey components of the raw mix have been thoroughly ground in the compeb wet mills to the requisite fineness, the resulting slurry is taken up by an Allis-Chalmers 4 inch rubber lined slurry pump and passed through pipe lines to the slurry storage tanks that have a capacity of about 6,000 barrels. Compressed air and mechanical methods will be used to agitate the slurry.

The kilns, 175 feet in length with diameters of 11 feet, were designed and built by the Allis-Chalmers Company. Temperatures range from 1200 degrees F., at the feeding end to 2850 degrees F., at the burning zone near the firing end. Four of these kilns will be utilized in the complete 5,000 barrel plant. Each kiln will have a capacity of 1,250 barrels daily and each unit will employ one kiln. Thus, in the first unit which the company intends to put in running order as soon as possible, one kiln will be used. The other units will soon be added.

The unit design of construction makes it possible to carry the project to completion while the first unit is in operation. In this way the company will be in a position to help meet the demands of the territory served while the plant is still under construction. It may be well to mention, while speaking of unit construction, that the plant has been so designed that other units of various kinds can be added later without disturbing what is now being built. In other words, if it is desired, after the complete 5,000 barrel plant is built, to considerably increase the capacity, other units can be built without changes in the existing layout.

Firing in the rotary kilns will be with coal which will first be dried in an Allis-Chalmers 8x55 foot Ebro type dryer. It will then be pulverized by fuller mills, elevated by blower to the pulverized coal bin above the feeder, and from there blown into the kiln.

It is worthy of notice that the transportation of the mix from the feed bin to the clinker storage utilizes gravity to the fullest extent. After coming from the kilns the clinker drops down to an 8x70 foot rotary cooler through which it passes and falls direct to the storage.

Clinker will be taken out of storage

by an overhead travelling crane and from there passed on to four 7x22 foot compeb dry mills. After these complete the work of grinding it to 200 mesh, the product will be taken up by style B bucket elevators and 16 inch screw conveyors and passed on to the silo bins for finished cement. Sacking houses are located in four places, one at each end of two series of six cement storage tanks. Across loading track No. 1 from the cement storage bins, silos, and sacking houses, is the sack department where sacks are prepared for use in the bagging machines.

When complete the plant will present an imposing enough appearance. The raw storage will be 650 feet long and 60 feet wide. The raw grind building will be 150 feet long, the coal drying building 100 feet long and the finish grind building 150 feet long. All of these buildings will be 60 feet wide. The complete plant itself will be more than 2,000 feet in length. On the grounds will be located offices, shops and stock rooms, together with such other necessary parts of a large enterprise, as water storage tanks, etc.

Outcroppings of suitable coal have been found within a few miles of the plant. Some of this coal will come from the top of Signal Mountain, directly above the plant itself, some from Raccoon Mountain by railroad and some from mines at present operating in that section. The general impression of the plant is that it is of very simple design and employs to good effect the natural advantages of the property. The operation will apparently be flexible. The method of construction that will permit of increasing the capacity 100 per cent in the same ground space without interfering with operations, is very desirable. While it is true that some of the dimensions of the plant may seem large for the production contemplated, it is also true that it is sufficiently compact to make supervision easy. A notable feature is the small amount of elevating and conveying machinery that is used. In this plant they "ride the stone" very little.

The company will begin operations on electrical power furnished by a local central station. If it becomes advisable to do so at a later date, waste heat boilers will be added and machinery turned over by steam made from the heat thus conserved. One of the sketches herewith shows how a waste heat boiler could be added to the plant,

# Quarry Accidents in the United States

In 1921 the quarry industry in the United States showed fewer fatal accidents to employees and slightly more nonfatal injuries than in 1920. According to reports from operating companies to the Bureau of Mines, the fatality rate declined from 2.31 per thousand employees in 1920 to 2 per thousand in 1921, and the injury rate rose from 145.51 to 174.54, these rates being based upon a standard of 300 working days per year.

Reports from 1,764 operators showed 77,185 employees, who worked 17,987,547 shifts, an average of 233 workdays per man. As compared with 1920, these figures indicate an increase of 47 operating companies, a loss of 5,139,101 shifts, and a reduction of 34 workdays per man.

Operations inside the quarries showed 49,292 employees, 10,824,541 shifts, and 220 average days per man; work at crushers and rockdressing plants showed 27,893 employees, 7,163,006 shifts, and 257 workdays per man. Each of these figures represents a reduction as compared with 1920.

Accidents during the year resulted in the death of 120 men and the injury of 10,465, as compared with 178 killed and 11,217 injured in 1920.

The accident rates for quarries producing stone for building or monumental work were 3.23 killed and 104.24 injured per thousand men employed, as compared with 1.22 killed and 152.37 injured in 1920; the rates for quarries where the stone is crushed were 3.40 killed and 230.51 injured per thousand employees, as compared with 2.66 killed and 213.9 injured in 1920. At the outside plants at the building-stone quarries the rates were 0.38 killed and 158.90 injured as compared with 0.95 killed and 126.30 injured; at crushers and cement mills the rates were 1.28 killed and 177.39 injured, as compared with 1.73 killed and 183.77 injured in 1920.

Of the 10,585 accidents at all quarries during the year, 1.13 per cent were fatal, 0.09 per cent resulted in permanent total disability, 3.12 in permanent partial disability, 17.91 per cent in temporary disability of more than 14 days, and 77.75 per cent in disability not exceeding 14 days but more than the remainder of the shift on which the accident occurred.

*Number of men employed, days' work performed, and number of men killed and injured at all quarries in the United States, 1911 to 1921.*

| Year             | Average<br>days<br>active | Actual<br>number | —Men employed—<br>Equivalent<br>in 300-day<br>workers<br>(calcu-<br>lated) |            | Total<br>shifts | Number killed<br>Per 1,000<br>300-day<br>workers<br>(calcu-<br>lated) |        | Number injured<br>Per 1,000<br>300-day<br>workers<br>(calcu-<br>lated) |  |
|------------------|---------------------------|------------------|--|------------|-----------------|---|--------|--|--|
|                  |                           |                  |  |            |                 | Total   |        | Total  |  |
| 1911             | 228                       | 110,954          | 84,417   | 25,325,094 | 188             | 2.23  | 5,390  | 63.85  |  |
| 1912             | 249                       | 113,105          | 93,837   | 28,151,042 | 213             | 2.27  | 6,552  | 69.82  |  |
| 1913             | 246                       | 106,278          | 87,141   | 26,142,237 | 183             | 2.10  | 7,739  | 88.81  |  |
| 1914             | 233                       | 87,936           | 68,187   | 20,456,157 | 180             | 2.64  | 7,836  | 114.92   |  |
| 1915             | 246                       | 100,740          | 82,447   | 24,734,224 | 148             | 1.80  | 9,671  | 117.30   |  |
| Aver for 5 yrs.  | 240                       | 103,803          | 83,206   | 24,961,750 | 182             | 2.19  | 7,437  | 89.39  |  |
| 1916             | 253                       | 90,797           | 76,457   | 22,937,178 | 173             | 2.26  | 13,427 | 175.62   |  |
| 1917             | 261                       | 82,290           | 71,525   | 21,457,357 | 131             | 1.83  | 13,242 | 185.14   |  |
| 1918             | 260                       | 68,332           | 59,285   | 17,785,504 | 125             | 2.11  | 8,719  | 147.07   |  |
| 1919             | 253                       | 75,505           | 63,794   | 19,138,308 | 123             | 1.93  | 9,199  | 144.20   |  |
| 1920             | 267                       | 86,488           | 77,089   | 23,126,648 | 178             | 2.31  | 11,217 | 145.51   |  |
| Aver. for 5 yrs. | 259                       | 80,682           | 69,630   | 20,888,999 | 146             | 2.10  | 11,161 | 160.29   |  |
| Av. for 10 yrs.  | 249                       | 92,243           | 76,418   | 22,925,375 | 164             | 2.15  | 9,299  | 121.69   |  |
| 1921             | 233                       | 77,185           | 59,958   | 17,987,547 | 120             | 2.00  | 10,465 | 174.54   |  |

Since 1915 the bureau's statistics of accidents at quarries have divided all injuries into five main classes as follows: 1, fatalities; 2, permanent total disabilities; 3, permanent partial disabilities; 4, temporary disabilities lasting more than 14 days; 5, temporary disabilities of more than the remainder of the shift on which the accident occurred but not to exceed 14 days.

During the 7 years covered by the table that follows, 76,938 accidents at quarries have been reported to the Bureau of Mines. Of these, 998 (1.30 per cent) resulted fatally, 101 (0.13 per cent) resulted in permanent total disability, 2,374 (3.09 per cent) in permanent partial disability, 12,692 (16.50 per cent) in



disability of more than 14 days, and 60,773 (78.99 per cent) in disability of 1 to 14 days, inclusive. During this period more than 147,000,000 shifts were worked by all quarry employees, so that the volume of exposure to occupational hazards indicates that the foregoing distribution of accidents may be accepted as typical of the severity of accidents that occur to persons engaged in the industry.

*Comparison of quarry accidents, 1915 to 1921.*

| Injury   | 1915    | 1916   | 1917   | 1918   | 1919   | 1920   | 1921   |
|--|---------|--------|--------|--------|--------|--------|--------|
| 1. Fatal .....                                       | 148     | 173    | 131    | 125    | 123    | 178    | 120    |
| 2. Serious (time lost more than 14 days):            |         |        |        |        |        |        |        |
| A. Permanent disability—                             |         |        |        |        |        |        |        |
| Total* .....   | 16      | 26     | 10     | 7      | 23     | 10     | 9      |
| Partial† .....                                       | 507     | 446    | 354    | 185    | 225    | 327    | 330    |
| B. Others .....                                      | 1,365   | 2,194  | 2,266  | 1,466  | 1,612  | 1,893  | 1,896  |
| 3. Slight (time lost, 1 to 14 days, inclusive) ..... | 7,783   | 10,761 | 10,612 | 7,061  | 7,339  | 8,987  | 8,230  |
| Total .....  | 9,819   | 13,600 | 13,373 | 8,844  | 9,322  | 11,395 | 10,585 |
| Men employed .....                                   | 100,740 | 90,797 | 82,290 | 68,332 | 75,505 | 86,488 | 77,185 |

\**Permanent total disability.*—Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

†*Permanent partial disability.*—Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

The quarries are classified according to the kind of rock, as follows: Cement rock, granite, limestone, marble, sandstone and bluestone, slate, and trap rock. Separate statistical tables are presented for each group and for all groups combined. The tables show the number of persons employed, the average number of working days per man, the total number of shifts worked by all employees, and the number of men killed or injured, thus making it possible to base fatality and injury rates throughout this report on a uniform number of days during which the workmen were exposed to the hazards of their occupations.

A summary of the more important figures for all quarries in the United States during the years 1921 and 1920 is given in Table 3. The percentage of accidents due to any one cause is given in Table 4. Wherever possible, comparative figures for previous years are given.

*Table 3.—All quarries: Men employed and number killed and injured, by kind of quarry, during the years ended December 31, 1921 and 1920.*

| Kind of quarry                | Active operators | Men employed  |  | Killed     |                           | Injured       |                           | Widows    | Orphans    |
|-------------------------------|------------------|---------------|--|------------|---------------------------|---------------|---------------------------|-----------|------------|
|                               |                  | Actual number | Equivalent in 300-day workers (calculated) | Num-ber    | Per 1,000 300-day workers | Num-ber       | Per 1,000 300-day workers |           |            |
| Cement rock .....             | 70               | 10,815        | 10,459                                     | 20         | 1.91                      | 2,233         | 213.50                    | 10        | 19         |
| Granite .....                 | 297              | 9,479         | 7,010                                      | 18         | 2.57                      | 940           | 134.09                    | 10        | 22         |
| Limestone .....               | 935              | 39,551        | 29,399                                     | 58         | 1.97                      | 5,248         | 178.51                    | 32        | 81         |
| Marble .....                  | 45               | 4,549         | 4,025                                      | 6          | 1.49                      | 406           | 100.87                    | 3         | 4          |
| Sandstone and bluestone ..... | 194              | 3,928         | 2,394                                      | 3          | 1.25                      | 374           | 156.22                    | 2         | 6          |
| Slate .....                   | 80               | 3,564         | 2,848                                      | 4          | 1.40                      | 385           | 135.18                    | 2         | 1          |
| Trap rock .....               | 143              | 5,299         | 3,823                                      | 11         | 2.88                      | 879           | 229.92                    | 6         | 12         |
| <b>Total, 1921.....</b>       | <b>1,764</b>     | <b>77,185</b> | <b>59,958</b>                              | <b>120</b> | <b>2.00</b>               | <b>10,465</b> | <b>174.54</b>             | <b>65</b> | <b>145</b> |
| 1920                          |                  |               |  |            |                           |               |                           |           |            |
| Cement rock .....             | 74               | 13,251        | 14,165                                     | 39         | 2.75                      | 2,585         | 182.49                    | 20        | 32         |
| Granite .....                 | 339              | 12,735        | 10,664                                     | 22         | 2.06                      | 1,392         | 130.53                    | 11        | 12         |
| Limestone .....               | 925              | 43,151        | 37,182                                     | 96         | 2.58                      | 5,321         | 143.11                    | 50        | 72         |
| Marble .....                  | 42               | 4,438         | 4,349                                      | 4          | .92                       | 400           | 91.98                     | 3         | 3          |
| Sandstone and bluestone ..... | 163              | 4,466         | 3,540                                      | 2          | .56                       | 356           | 100.56                    | 1         | 4          |
| Slate .....                   | 75               | 3,496         | 3,364                                      | 5          | 1.49                      | 364           | 108.20                    | 3         | 9          |
| Trap rock .....               | 99               | 4,951         | 3,825                                      | 10         | 2.61                      | 799           | 208.89                    | 6         | 12         |
| <b>Total, 1920.....</b>       | <b>1,717</b>     | <b>86,488</b> | <b>77,089</b>                              | <b>178</b> | <b>2.31</b>               | <b>11,217</b> | <b>145.51</b>             | <b>94</b> | <b>144</b> |

Granite quarries employed 9,479 men during 1921, or 3,256 men (26 per cent) less than in 1920. In the pits proper 7,105 men were employed, while

2,374 men worked at the outside rock-dressing plants. The total working time was 2,102,854 shifts, an average of 222 days per man or 29 days per man less than the year before.

Accidents resulted in the death of 18 men (4 less than in 1920) and the injury of 940 (452 less than in 1920). The accident rates per thousand 300-day workers were therefore 2.57 killed and 134.09 injured, as compared with 2.06 killed and 130.53 injured in the preceding year.

The main causes of accidents inside the quarries were flying objects, handling rock, machinery, falls or slides of rock, and falling objects; the first cause named was responsible for one-third of all injuries to men in the pits. At the rock-dressing plants outside the quarries, nearly one-half of the injuries were due to flying objects, the others being due mainly to handling rock, hand tools, machinery, and falling objects.

Eight hours per day constituted the standard workday for 55.7 per cent of the men in the quarries, 9 hours for 16.8 per cent, and 10 hours for 16 per cent. At the outside plants 8 hours was the standard workday for 71.1 per cent of the men, 9 hours for 7.5 per cent, and 10 hours for 11.8 per cent.

Limestone quarries constitute the largest branch of the quarry industry, usually employing about half of all quarry workers in the United States. Companies producing limestone in 1921 employed 39,551 men, 8 per cent less than in 1920. The total working time for all employees was 8,819,813 shifts, each man averaging 223 workdays during the year, a loss of 36 days per man from the year before.

Accidents to employees resulted in 58 deaths and 5,248 injuries, or 1.97 fatalities and 178.51 injuries per thousand 300-day workers, the former being smaller and the latter being larger than the corresponding rate for the preceding year.

Most of the injuries inside the quarries were caused by handling rock at face, flying objects, haulage, falls or slides of rock or overburden, machinery, falling objects, and falls of persons. At the outside plants the accidents resulted mainly from machinery, flying objects, falling objects, falls of persons, hand tools, and haulage. The distribution of the accidents is given in Table 2.

The operators' reports showed that 21.3 per cent of the men working inside the pits were employed 8 hours per day, 23.4 per cent 9 hours, and 43.8 per cent 10 hours. Of the employees at the outside plants, 9 per cent worked 8 hours per day, 22.5 per cent 9 hours, and 42.9 per cent 10 hours.

Quarries producing sandstone and bluestone employed 3,928 men, of whom 3,090 worked inside the pits; 838 worked at the outside plants where they were engaged in crushing or dressing the stone. The working time for all employees was equivalent to 718,310 shifts, an average of 183 days per man, or 55 workdays less than in 1920.

Accidents resulted in the death of 3 men and the injury of 374, the resulting rates being 1.25 killed and 156.22 injured per 1,000 men employed (300-day workers). The corresponding rates for the preceding year were 0.56 killed and 100.56 injured. About 78 per cent of the accidents in 1921 occurred at quarries in New York, Ohio, and Pennsylvania; these three States employed 70 per cent of all employees engaged producing sandstone and bluestone in the United States.

Most of the injuries were due to handling rocks, flying objects, falls or slides of rock or overburden, machinery, and falling objects, in the order stated. The total number of injuries represents an actual increase of 18 over the year 1920.

Reports received from the operating companies indicated that among the workmen inside the quarry pits 23.3 per cent were employed on the basis of 8 hours per day, 24.1 per cent on the 9-hour basis, and 50 on the 10-hour basis. Among the men employed at the outside plants, the 8-hour day prevailed among 18.1 per cent, the 9-hour day among 25.5 per cent, and the 10-hour day among 52.5 per cent.

Reports from 70 companies operating cement-rock quarries showed that they employed 10,815 men, of whom 3,432 worked in and about the pits proper, and 7,383 worked at the outside plants and mills. The men averaged 290 workdays during the year, and worked an aggregate of 3,137,789 shifts. The working time represents a loss of 31 days per man as compared with 1920, while the total number of shifts indicates a loss of 26 per cent.

Accidents killed 20 and injured 2,233 men, or 1.91 killed and 213.50 injured



per 1,000 employees (300-day workers). For 1920 the corresponding rates were 2.75 killed and 182.49 injured. Of the 20 fatalities, 5 occurred in California, 3 in Illinois, and 2 each in New York and Pennsylvania.

The leading causes of accidents inside the quarries were haulage equipment, falls or slides of rock, flying objects, machinery, falling objects, handling rock, and falls of persons. Most of the injuries to employees at the outside plants were due to falling objects, machinery, flying objects, falls of persons, hand tools, and burns.

The established length of the working day at cement-rock quarries was for men inside the pits, 8 hours for 10.7 per cent of the workers, 9 hours for 19.8 per cent, and 10 hours for 54 per cent. At the outside plants and mills, 17.7 per cent of the men were employed on the basis of 8 hours per day, 0.7 per cent 9 hours, 7.7 per cent 10 hours, and 19.5 per cent 12 hours.

Reports covering accidents at marble quarries were received from 45 plants that were operated part or all of the year. The operators reported the number of men working as 4,549 and the total working time as 1,207,467 shifts, an average of 265 days per man. Of the total number of employees, 2,138 men worked in the quarries and 2,411 worked at the outside rock-dressing plants. An increase in marble quarrying operations is indicated by the fact that more men were employed in 1921 than in any year since 1916.

Accidents resulted in 6 fatalities and 406 injuries during the year, thus indicating a fatality rate of 1.49 and an injury rate of 100.87 per 1,000 employees (300-day workers) as compared with rates of 0.92 killed and 91.98 injured in 1920. Of 170 nonfatal injuries to men working inside the quarries, the majority were due to machinery, drilling and channeling, flying objects, handling rock at face, and falls of persons. Of the 236 injuries at the rock-dressing plants, the main causes were handling rock, machinery, hand tools, flying objects, and falling objects.

For work inside the quarries proper, the reports showed that the 8-hour day prevailed among 36 per cent of the employees, the 9-hour day among 31.8 per cent, and the 10-hour day among 30.5 per cent. Among the men working at the outside plants, 69.4 per cent were employed on the basis of 8 hours per day, 27.9 per cent 9 hours, and only 2.6 per cent 10 hours.

Slate quarries operating in 1921 employed 3,564 men, each of whom averaged 240 work-days during the year, or a total of 854,396 shifts in all. As compared with 1920 the operating time represents a loss of 49 days for each employee. Of the total number of workmen, 2,695 were employed in the quarries and 869 at the outside plants; the former averaging 232 and the latter 263 working days during the year.

Accidents killed 4 men and injured 385 resulting in a fatality rate of 1.40 and an injury rate of 135.18 per thousand 300-day workers as compared with 1.49 and 108.20, respectively, for the preceding year. Of the 280 injuries to men in the quarries, the main causes were handling rock at face, falls or slides of rock, flying objects, machinery, and nails and splinters. At the rock-dressing plants most of the 105 injuries were due to handling rocks, nails and splinters, and machinery.

Nearly all of the employees at slate quarries were reported as working on the basis of 9 hours per day, the number so reported being 2,200 or 81.6 per cent of the total; 14.4 per cent worked 10 hours per day. At the outside plants 73.6 per cent of the men worked 9 hours, and 26.4 per cent worked 10 hours per day.

Reports received from 143 operators of traprock quarries for 1921 showed 5,299 men employed and a total working time of 1,146,918 shifts, an average of 216 shifts per man. In the quarries proper 3,945 men were employed, while 1,354 men worked at the crushers and other outside plants. Though the figures for 1921 seemingly show an increase of 348 employees over 1920 this apparent increase is from the inclusion in 1921, of employees at traprock quarries in California, who in 1920 were included with the employees at granite quarries, as reported by the California Industrial Accident Commission. After allowance for inclusion, the reports for 1921 represent an actual reduction of approximately 20 per cent in employees and 23 per cent in total shifts worked.

Accidents during the year resulted in 11 deaths and 879 injuries to the workmen; 8 of the fatalities and 680 injuries occurring inside the pits and 3 fatalities and 199 injuries occurring at the outside plants. The accident rates per thousand 300-day workers were 2.88 killed and 229.92 injured, as compared

with 2.61 killed and 208.89 injured in 1920. In the quarries proper most of the accidents were caused, by handling rock at face, flying objects, falls of slides of rock, machinery, haulage, and falling objects. At the outside shops the main causes of injuries were flying objects, machinery, haulage, falls of persons, and falling objects.

The standard working time inside the quarries was 8 hours for 10 per cent of the men, 9 hours for 26.5 per cent, and 10 hours for 31.7 per cent. In the outside plants 9.1 per cent of the employees worked 8 hours per day, 29 per cent 9 hours, and 39.7 per cent 10 hours.

Table 4 compares the percentage of accidents from various causes in the quarries and at outside work. The table shows the percentage of fatalities by causes for the entire industry, the percentage of accidents inside the quarries. The percentages of accidents inside and outside the quarries show more nearly the true hazard of each branch of the industry than those in the first column, based on the industry as a unit.

Table 4.—All quarries: Causes of fatalities and injuries, showing percentage due to each cause and corresponding rates per 1,000 300-day workers employed during the year ended December 31, 1921.

| Cause of accident                                    | Number killed     |                           |                   |                           | Number Injured    |                           |                   |                           |
|--|-------------------|---------------------------|-------------------|---------------------------|-------------------|---------------------------|-------------------|---------------------------|
|  | Per cent of total | Per 1,000 300-day workers | Per cent of total | Per 1,000 300-day workers | Per cent of total | Per 1,000 300-day workers | Per cent of total | Per 1,000 300-day workers |
|  | Grand total       | Class total               | Grand total       | Class total               | Grand total       | Class total               | Grand total       | Class total               |
| In and about quarry:                                 | 1                 | 2                         | 3                 | 4                         | 5                 | 6                         | 7                 | 8                         |
| 1. Falls or slides of rock or overburden .....       | 16.67             | 25.00                     | 0.33              | 0.55                      | 5.92              | 10.28                     | 10.34             | 17.1                      |
| 2. Handling rock at face..                           | 3.33              | 5.00                      | .07               | .11                       | 10.94             | 18.99                     | 19.10             | 31.7                      |
| 3. Timber or hand tools...                           | .....             | .....                     | .....             | .....                     | 2.30              | 4.00                      | 4.02              | 6.6                       |
| 4. Explosives .....                                  | 14.17             | 21.25                     | .28               | .47                       | 1.89              | 3.28                      | 3.30              | 5.4                       |
| 5. Haulage .....                                     | 10.00             | 15.00                     | .20               | .33                       | 5.29              | 9.19                      | 9.24              | 15.3                      |
| 6. Falls of persons.....                             | 5.83              | 8.75                      | .12               | .19                       | 2.77              | 4.81                      | 4.84              | 8.0                       |
| 7. Falling objects (other than 1 and 2).....         | 1.67              | 2.50                      | .03               | .06                       | 3.27              | 5.67                      | 5.70              | 9.4                       |
| 8. Flying objects .....                              | 3.33              | 5.00                      | .07               | .11                       | 8.87              | 15.39                     | 15.48             | 25.7                      |
| 9. Electricity .....                                 | 1.67              | 2.50                      | .03               | .06                       | .17               | .30                       | .30               | .5                        |
| 10. Drilling and channelling (by machine or hand)... | .83               | 1.25                      | .02               | .03                       | 2.26              | 3.92                      | 3.93              | 6.5                       |
| 11. Machinery .....                                  | 6.67              | 10.00                     | .13               | .22                       | 5.26              | 9.12                      | 9.17              | 15.2                      |
| 12. Nails, splinters, etc....                        | .....             | .....                     | .....             | .....                     | 1.13              | 1.96                      | 1.97              | 3.2                       |
| 13. Boiler and air-tank explosions .....             | 1.67              | 2.50                      | .03               | .06                       | .04               | .07                       | .07               | .1                        |
| 14. Burns .....                                      | .....             | .....                     | .....             | .....                     | .95               | 1.66                      | 1.67              | 2.7                       |
| 15. Other causes .....                               | .83               | 1.25                      | .02               | .03                       | 6.55              | 11.36                     | 11.42             | 18.9                      |
| Total .....  | 66.67             | 100.00                    | 1.33              | 2.22                      | 57.61             | 100.00                    | 100.55            | 167.0                     |
| In outside works:                                    |                   |                           |                   |                           |                   |                           |                   |                           |
| 16. Haulage .....                                    | 4.17              | 12.50                     | .08               | .21                       | 2.83              | 6.67                      | 4.94              | 12.4                      |
| 17. Machinery .....                                  | 8.33              | 25.00                     | .16               | .42                       | 5.52              | 13.03                     | 9.64              | 24.2                      |
| 18. Hand tools .....                                 | .....             | .....                     | .....             | .....                     | 3.43              | 8.09                      | 5.99              | 15.0                      |
| 19. Nails, splinters, etc....                        | .....             | .....                     | .....             | .....                     | 1.93              | 4.55                      | 3.37              | 8.4                       |
| 20. Electricity .....                                | 5.83              | 17.50                     | .12               | .29                       | .63               | 1.49                      | 1.10              | 2.5                       |
| 21. Falls of persons.....                            | 3.33              | 10.00                     | .07               | .17                       | 3.32              | 7.82                      | 5.79              | 14.8                      |
| 22. Falling objects (rocks, timbers, etc.) .....     | 3.33              | 10.00                     | .07               | .17                       | 4.61              | 10.87                     | 8.04              | 20.1                      |
| 23. Flying objects .....                             | .....             | .....                     | .....             | .....                     | 6.60              | 15.58                     | 11.52             | 28.8                      |
| 24. Handling rock by hand..                          | .....             | .....                     | .....             | .....                     | 2.59              | 6.11                      | 4.52              | 11.3                      |
| 25. Burns .....                                      | 3.33              | 10.00                     | .07               | .17                       | 2.43              | 5.73                      | 4.24              | 10.6                      |
| 26. Other causes .....                               | 5.00              | 15.00                     | .10               | .25                       | 8.50              | 10.06                     | 14.84             | 37.2                      |
| Total .....  | 33.33             | 100.00                    | .67               | 1.68                      | 42.39             | 100.00                    | 73.99             | 185.7                     |
| Grand total .....                                    | 100.00            | .....                     | 2.00              | .....                     | 100.00            | .....                     | 174.54            | .....                     |

Falls or slides of rock or overburden caused the third largest number of accidents among men working in the quarries; they resulted in 20 deaths and 620 injuries, or 17.74 accidents per thousand 300 day workers, as compared with 14.80 per thousand employees in the previous year. The number of accidents from falls of quarry material was exceeded by the number resulting from handling rock at face and from flying objects, the accident rates for which were 31.84 and 25.83, respectively, per thousand men employed inside the quarries.

Among the hazards to which the quarry workers were exposed in 1921, the use of explosives ranked second in the number of resulting fatalities and tenth in the number of nonfatal injuries, thus indicating the large proportion of fatal accidents from this cause. Out of 215 accidents from explosives, 17 were fatal and 198 nonfatal, the accident rate being 5.96 per thousand em



ployees (300-day basis) as compared with 5.48 per thousand in 1920. Most of the accidents from explosives resulted from premature shots, striking in loose rock, charging, and drilling into old holes.

Haulage accidents in 1921 resulted in 12 deaths and 554 injuries to men in the quarries and 5 deaths and 296 injuries to men employed at outside works. For the men in the pits the accident rate was 15.68 per thousand employees (300-day workers) as compared with 18.02 in the preceding year; for the men at the outside plants the rate was 12.61 as against 14.62 in 1920. These figures, Table 19, indicate that in 1921 haulage accidents ranked fourth as a cause of accidents to quarry employees and sixth to employees at outside works.

Accidents caused by machinery resulted in 8 deaths and 550 injuries to men employed inside the quarries, and 10 deaths, and 578 injuries to men at crushers and rock-dressing plants outside the quarries. Machinery thus ranked fifth as a cause of accidents inside the pits and second as a cause of accidents at outside plants. Inside the pits the accident rate, including fatal and non-fatal injuries, was 15.46 per thousand men employed (300-day workers); at the outside plants the rate was 24.63. For the preceding year these rates were 11.46 and 22.98, respectively.

The hazards to which quarrymen are exposed are not the same for all kinds of quarries. Much depends on whether the stone is being produced for structural purposes, or whether it is to be crushed and used as a flux, or for making lime, or for road building. If the stone is to be used for monumental or structural purposes, much care in quarrying and handling must be exercised to prevent breakage, and a minimum amount of explosives used. On the other hand, if the stone is to be crushed, large quantities of explosives may be used and no care to prevent breakage in handling and hauling need be exercised.

These facts indicate that accidents from falling quarry material, from handling rock, and from explosives should be more frequent at crushed-stone quarries than at building-stone quarries. This conclusion is proved by Table 27, which covers accidents at these two classes of quarries during the past five years, based on reports from operating companies. The table shows the relative frequency of accidents from different causes, based upon the number of men employed (calculated upon a standard of 300 work days per year). The injury rates from accidents that may be attributed to the lack of need to prevent breakage of stone, are consistently higher at the crushed-stone quarries.

The Limestone Quarries Company, of Delphos, Ohio, is preparing to open up a new quarry not far from the site of the present plant. This new plant will have a very much greater capacity than the one which is now being operated by the company, and which will continue in operation until the new plant is in readiness.

The Pittsburgh & Zanesville Mining Co., have purchased 2,200 acres of land on the west side of the Muskingum River near Zanesville. The new are planning to develop the coal, sand and clay deposits which are abundant in this section. The sand lies over the coal and the clay under the coal, and mining will be by stripping and deep mine methods. The investment will reach in the neighborhood of \$600,000. The chief promoters in this enterprise are, R. C. Burton and C. E. Corbin of Zanesville, J. M. McNeill of Pittsburgh, and the Blanchard Coal Co., of Pittsburgh.

A. W. Berghoefer, intimately known to the coal and ice trade, has again become associated with the Gifford-Wood Co., of Hudson, N. Y., and will be located at the company's New York office at 50 Church St.

Mr. David Augustus Decrow, who died February 15th, became associated with the Holly Mfg. Co., in the early '80s. During his association with that company he became known as a water-works engineer of national prominence and continued his work in that line until the time of his death. Some years ago the Holly Mfg. Co., was combined with the Snow Steam Pump Works which was later succeeded by the Worthington Pump and Machinery Corp. Mr. Decrow remained with what was to all intents and purposes the same organization from the time he began his professional work until the close of his career. He was buried in Lockport, N. Y., and is survived by a wife and two sons.

## Two Big Agstone Days

### Work in Ohio and Pennsylvania Stimulated as Result

At Cleveland, Ohio, March 5, and at Harrisburg, Pa., March 6, the National Agstone Association put in two days of intensive and resultful endeavor.

President E. M. Lamkins stated that a discussion of three projects were the objects of the Cleveland meeting.

1. Founding and financing an agstone fellowship at Ohio State University.

2. Establishing a research and review service.

3. The financing of an advertising program.

Prof. Firman E. Bear, chief of the Soils Department at Ohio State University, presented in detail the work the Ohio College had done, is doing, and expects to do in teaching the need of agstone on Ohio farms. Prof. Bear called attention to an editorial in Breeders Gazette, issue of March 1, 1923; and a story in the Country Gentleman, issue of March 3, 1923, in which doubt is expressed as to whether or not the soil needs limestone to encourage the growth of certain plants. These articles are not in harmony with the teachings of soil experts, he said. They are disputed by experience and experiment.

Prof. Bear made an earnest appeal for an agstone fellowship at Ohio State University. Discussions and questions followed his address. April 1, 1923, was deemed an opportune time to start the fellowship work, if a suitable man could be found satisfactory to Prof. Bear, the Agricultural College, the Board of Trustees of O. S. U., and the National Agstone Association. The young man accepting this fellowship is to devote his entire time to this work, with one month vacation each year. This fellowship student to make reports at end of the year when same is approved and released by Prof. Bear, or his Soils Department. Prof. Bear further advised the donors of this fellowship not to expect immediate results, as this fellowship would be to establish basic facts on which the State University could base the compilation of future bulletins and its program of teaching the needs and the results of using limestone, and thereby assist the agstone industry in promoting the sale and use

of agstone in the best way to do the most good for the farm.

Mr. J. C. King moved and Mr. A. Acton Hall supported a motion that the National Agstone Association finance an agstone fellowship at Ohio State University for a period of 5 years at \$2,000 per year, and this sum be paid in quarterly installments by the following Ohio agstone producers:

Ohio Marble Company, Piqua,  
Carbon Limestone Co., Youngstown.  
Bessemer Limestone Co., Youngstown.  
Kelley Island Lime & Transport Co., Cleveland.

France Stone Company, Toledo.  
Colgan Limestone Products Co., Columbus.

Marble Cliff Quarries Co., Columbus.

Agreement was reached that the results of this agstone fellowship in Ohio State University at a total cost of \$10,000, subscribed by Ohio Agstone producers, should be used to benefit and promote the interests of all members of the association.

In the matter of a research and review service, agreed to at Chicago meeting, January 18, 1923, Mr. Hall moved and Mr. King supported a motion that A. P. Sandles, secretary, and Harry Brandon proceed to arrange with Prof. Bear of Ohio State University to secure the services of some person to assemble bulletins, reports, literature and data published or issued by agricultural colleges, experiment stations, soils departments, farm papers, trade journals, etc., having a bearing upon the agstone industry; that such employed person shall review all such literature and reports and assemble same in the form of a clipping service and research comments and furnish same to all members of the National Agstone Association to assist them in promoting the use and sale of agstone, and not more than \$1,000 per year be spent in research and review service. The motion was agreed to.

A motion was approved to appropriate \$5,000 for a general advertising campaign in Ohio and that said sum be paid by Ohio Agstone producers on the basis of their 1922 tonnage output.

The secretary presented applications for memberships as follows:

New Castle Lime & Stone Company, New Castle, Pa.

Limestone Products Corp. of America, Newton, N. J.

E. J. Lavino & Company, Philadelphia, Pa.

Kittanning Limestone Company, Kittanning, Pa.

The secretary presented the fi-



nancial report of the secretary and treasurer which showed all membership dues paid, no bills unpaid and money in the bank.

At Penn Harris Hotel, Harrisburg, Tuesday, March 6, the Pennsylvania-Eastern group meeting was called to order. J. C. King, chairman of the board of directors, presided. The following persons were present during the day:

Governor Gifford Pinchot.  
President Thomas of State College.  
W. C. Byers, Agricultural Bureau Director of Pennsylvania State Chamber of Commerce.  
Mr. Willits, Pennsylvania State Secretary of Agriculture.  
Prof. Hittsman, State College, Penn.  
Prof. J. W. White, State College.  
E. B. Reinhold, Reinhold-Owens Co., Pittsburgh (and two brothers)  
K. C. Styers, Grove City Limestone Co., Grove City, Pa.  
R. W. Stone, Asst. State Geologist, Penn. Geological Survey.  
S. S. Scholl, E. I. Du Pont de Nemours & Co., Pittsburgh, Pa.  
Wm. D. Kochersperger, Limestone Products Co., Mifflinsburg, Pa.  
A. Action Hall, The Ohio Marble Co., Piqua, Ohio.  
H. H. Brandon, The Ohio Marble Co., Piqua, Ohio.  
W. S. Rupp, The Baugh & Sons Co., Baltimore, Md.  
Ellwood Gilbert, New Castle Lime & Stone Co., New Castle, Pa.  
Glenn H. Campbell, National Stockman & Farmer, Pittsburgh, Pa.  
E. R. Walker, Pennsylvania Farmer, Philadelphia, Pa.  
Fred J. Streeter, Michigan Limestone & Chemical Co., Buffalo, N. Y.  
Edgar M. Lamkin, Kelley Island Lime & Transport Co., Cleveland, O.  
Edw. S. Bixler, Limestone Products Corp. of America, Newton, N. J.  
R. S. Newman, Ohio Farmer, Cleveland, Ohio.  
J. C. King, Carbon Limestone Co., Youngstown, Ohio.  
F. W. Cramer, York Valley Lime & Stone Co., York, Pa.  
John B. Fox, West Branch Lime Co., Williamsport, Pa.  
A. P. Sandles, Secretary, Nat'l Agstone Ass'n., Columbus, Ohio.

Chairman King stated that at suggestion of the Pennsylvania agstone producers this meeting was being held to discuss a general advertising campaign in Pennsylvania and also to discuss a \$100,000 memorial building at Pennsylvania State College in memory of the late Dr. Freer.

Chairman King introduced Prof. J. W. White who made an appeal for funds for this building. Prof. White said the first use of agricultural lime of record was in Lancaster County, Pennsylvania, and his state had nearly one-fourth of all the limestone in the United States. Chairman King stated that he was in thorough sym-

pathy with Prof. White's splendid address and that agstone producers would personally contribute, but being a national association with members in many states he doubted the wisdom of the association voting funds for this project.

Agstone producers broke bread with distinguished citizens of the Keystone state. Governor Pinchot is one of the foremost Americans in the public eye today. Dr. Thomas as president of the Pennsylvania State College is a noted educator. His chief soil expert, Prof. J. W. White, is known throughout the country. The Pennsylvania secretary of agriculture, Mr. Willits, is a dirt farmer and the champion mushroom grower of the nation. His annual production is near 50 tons, which he markets at a price of \$500 to \$600 a ton. Director Byers of Pennsylvania State Chamber of Commerce, has had experience as agricultural agent of the New York Central Lines, and is now boosting agricultural limestone and lime. These men were guests. Lieut.-Governor David A. Davis came to the hotel and expressed regret that pressing official duties would prevent his presence.

A. P. Sandles introduced Governor Pinchot and other luncheon speakers. This mid-day meeting was a feast of good fellowship.

At the afternoon session, decision was made to start an advertising campaign, and the following firms expressed a willingness to subscribe:

|   |           |
|---|-----------|
| Carbon Limestone Co., Ohio....                | \$ 500.00 |
| Limestone Products Corp. N. J. .              | 250.00    |
| Michigan Limestone & Chemical Co., N. Y. .... | 500.00    |
| York Valley Lime & Stone Co., Pa. ....        | 100.00    |
| New Castle Lime & Stone Co., Pa. ....         | 100.00    |
| Grove City Limestone Co., Pa. .               | 100.00    |
| Limestone Products Co., Pa. . .               | 50.00     |

\$1,700.00

Pennsylvania producers agreed to hold another meeting, Tuesday, April 3, 1923, at Harrisburg, to further discuss this advertising campaign. Each producer present agreed to vigorously urge all Pennsylvania agstone producers to attend this April meeting and secure the additional \$1,300 to pay for the \$3,000 advertising campaign to promote the use and sale of agstone in the state of Pennsylvania. Mr. P. B. Reinhold was made temporary chairman of Pennsylvania group for the April meeting.

## Kentucky Road Work

Kentucky has been smarting a little under the stigma of reports among motorists that it is a good state to detour because of the incompleted and disconnected condition of the highway. This is arousing a little extra effort along good road lines and it is developing a strong plea to have the legislature submit to the people a fifty million dollar bond issue proposition which failed of passage at the last session. H. Green Garrett, of Winchester, Highway Commissioner of Kentucky, who is a man of aggressive business methods as well as broad vision, has been making a very earnest plea for this bond issue and has prepared figures demonstrating how it can be taken care of without any increased burden of taxation.

Recently a special committee of the Board of Trade of Louisville, which has been making a study of this question, made a very elaborate and favorable report practically coinciding in detail with the arguments advanced by Commissioner Garrett.

This committee in its report says that in 1922 Kentucky had available for road purposes \$3,425,000 derived from the following sources of taxation:

|                      |            |
|----------------------|------------|
| Gasoline taxes ..... | \$ 587,000 |
| Automobile .....     | 2,138,000  |
| Three cent tax ..... | 700,000    |

It estimates, too, that the income from these sources for 1923 will be approximately \$3,800,000.

There is then a review of the money spent and the work done during 1922, followed by a tabulation of bond issues by neighboring states, and the report winds up with the following recommendations:

First—That the question of a \$50,000,000 bond issue should be submitted by the Legislature to a vote of the people who alone can decide it.

Second—That Kentucky's Road System shall be at all times under the control of a bipartisan commission to be appointed by the Governor with the approval of the Senate and that the two candidates for the Governorship when nominated and before the election, will lay aside political differences, agree upon and announce the personnel of said Commission to be named by them in the event the bonds are voted.

Third—Legislation restricting the

weight and type of vehicles permitted to make use of the roads constructed and maintained with public funds.

From this it will be seen that the Kentuckians have been stirred up by reports of backwardness in their road construction and the present indications are that not only will there be a hard drive for a bond issue to carry on in the future, but there will be an energetic pushing of road work this year with whatever funds are available, and there promises to be enough of this to make active times in the development of quarrying and crusher work and in road construction contracts.

## Investigation of Mineral Fillers

In the investigation of non-metallic minerals in order to determine their use as mineral fillers, being conducted at the Southern experiment station of the Bureau of Mines, Tuscaloosa, Ala., a special study is being made of the determination of the grain size and character of grains of representative fillers produced in the district. The investigation includes a study of the various methods of calculation of average grain size of mixed products, the development of a method of measurement of grain size applicable to fillers in which there is a great range in size, varying from diameters of 100 microns or more to zero, and the determination of average grain size of representative samples of commercial fillers including clay, barite, fuller's earth, whiting, mica, ocher, slate, silica and talc. The character and size of particle of fillers is a basic property that has an important effect on the other physical properties and characteristics and a knowledge of it is important in the application of fillers to different uses.

The effect of grain size of fillers in compounding is also being studied by the bureau. This investigation will especially be conducted along the line of determining the difference in actual use between a filler made up of mixed sized grains as usually employed, and the same material but classified within as close limits as possible as regards variation in grain size, but having the same average diameters as the mixed product. It will also include the determination of the difference in effect between two products of the same material, but classified be-



tween different limits of grain size.

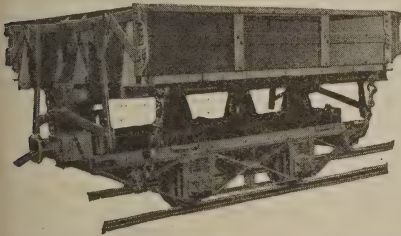
The effect of heat treatment on the properties of non-metallic minerals other than clays with respect to their use as fillers is also being studied by the Bureau of Mines. This will involve a determination of the effect of heating at different temperatures on the specific gravity, loss in weight, color, grain size, oil absorption, covering power or spread and ease of grinding. Previous work on clays along the same line has shown an improvement of certain samples for filler use.

The relationship between grain size, oil absorption and covering power of fillers and pigments is also being studied. The general direction of this relationship is known but no exact data are available on the subject. Also for two different minerals of same size, the relationship varies and a mineralogical coefficient will be sought. In addition, the effect of products classified as to size will be studied.

## Square Box Dump Cars

Something new in the line of square box dump cars, produced by the Koppel Industrial Car & Equipment Company of Koppel, Pa., is shown in these illustrations.

To meet the demands for heavy, substantial equipment, the Koppel Company have designed a car known as the "hinged" type, the body of which is permanently hinged to the underframe. It is noted for its sub-

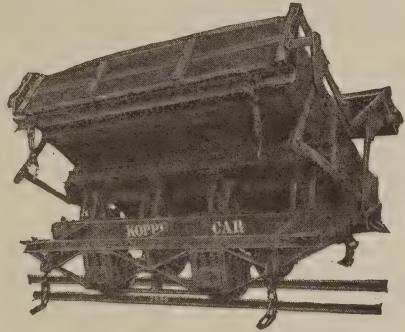


stantial door construction; its large door opening which enables the car to dispose of large boulders, eliminating the danger of such obstacles becoming wedged between the door and floor; pressed steel diaphragms in the underframe, also for its great flexibility, this car being equipped with double spring suspended bearings.

The doors and ends are constructed of 1½ inch oak, stiffened and protected by steel angles; the door top

angle is trussed at center insuring a strong edge at top of door which will withstand accidental steam shovel blows. The door opening of this car is very large and the dumping angle steep, affording clear discharge of contents. Doors are operated by Koppel patented toggle arrangement.

The floor is made of 2¾ inch oak, mounted on a rigid steel frame con-



sisting of center and side sills made of channel and rolled angles. Heavy tee sections are riveted to these sills forming a rigid unit to which the floor is bolted. The body is provided with four cast steel hinges securely riveted between center sills, thus permanently fastening the body to the frame of car.

The underframe of the car is composed of center and side sills made of channel and rolled angles. These sills are mounted on heavy steel bolsters braced by arch bars. A distinct feature of the Koppel car is the framework of pressed steel diaphragms between the center and side sills and bolsters.

Chilled iron wheels on 4 inch steel axles form the running gear. The journal boxes are semi-steel; the boxes with lead lined brass bearings are suspended in two well dimensioned helical springs, this arrangement insuring great flexibility to the car when traveling over rough roadways. The cars are equipped with spring draft gear, having link and pin couplers.

Mr. Fred Braun, of Algoma, Wis., has plans under way for establishing a limestone crushing plant at that city. The limestone rock will be taken from the shores of Lake Michigan and from Kewaunee and Door counties.

## For Heavy Production

### Spring Business Looms Big in The East

By Our Eastern Correspondent

Spring business looms big with the sand and gravel producers in the New York and eastern districts, and there is every indication of a record-breaking season in the industry. Heavy production is planned at the different plants in this locality and preparations are now being made for continuous operations for months to come; sand and gravel pits are being made ready for working, with necessary repairs and replacements in equipment.

The labor situation gives the greatest concern at the moment, and good men are extremely difficult to obtain. All sorts of inducements are being offered in recruiting working forces, even beyond the quite well established wage scales of 30 to 50 cents an hour, as now prevailing in this section. Every industry which requires common labor has drawn heavily on the supply, and the seasonal or near-seasonal activity is handicapped as compared with the branch of trade offering continuous employment.

With the construction industry moving along at top pace, building supply dealers are ordering and stocking up with sand, gravel, cement and other basic commodities, and if evidence was needed of forthcoming scope of activities, it could be found readily in the sizable business being placed. Road operations are also of encouraging status, and large quantities of cement, broken stone and affiliated materials will find their way in this phase of construction during 1923.

Prices are very firm, with strong tendency towards higher levels as spring trade reaches its peak. Recent advances in western cities in the line of cement and other stocks are reflected in the tone of the New York market. There is a disposition on the part of producers and dealers to resist increased schedules just as long as possible.

Good washed gravel maintains a \$2.00 level in carload lots, both 1½ and ¾-inch sizes, and since the advent of more spring-like weather, there has been a noticeable increase in distribution. Dealers are asking \$2.75 a cubic

yard for the material, delivered on the job.

The best grade sand continues at \$1.00 a cubic yard in wholesale quantities to dealers and contractors. The immediate supply is sufficient for all demands and with quite heavy shipments due from the Cow Bay district the situation is well in hand. Dealer price the material at \$2.00 a cubic yard, delivered. Sharp white sand holds at \$4.50 a cubic yard in retail lots.

There is no change in price levels in the broken stone market; 1½-inch stock is selling for \$1.65 a cubic yard in cargo shipments, f. o. b. city, while smaller sizes, ¾-inch graded, stands at a level of \$1.75. The New York and neighboring supply yards list the material at \$4.00 a cubic yard, both sizes, delivered in nearby zones.

Early spring quotations on Portland cement in the eastern district show no variation, despite the fact that a number of the western mills have advanced the base. The Lehigh Valley section, however, one of the main sources of supply for New York and vicinity, is holding to the established level. At New York, alongside dock, \$2.30 is the barrel quotation, while delivered by motor truck to dealer or contractor, an advance to \$2.60-\$2.70 is asked. A year ago, the base was 30 cents a barrel under these figures. The established price at the supply yards is \$3.20 a barrel, delivered on the job, with regular bag rebate of 10 cents.

Lime is operating under an active call, and there is an appearance of higher levels in current quotations. Hydrated material is from \$16.85 to \$17.10 a ton, wholesale at the warehouse, finishing stock; common hydrated lime is \$13.10 a ton. Regular lump lime is selling for \$3.75 a barrel in large quantities, while common lump material is priced at \$3.10 to \$3.25 a barrel in wholesale lots, warehouse. The latter stock in standard 300-pound barrel is being turned by dealers at a level of \$3.75, while finishing material, same sized container, is \$4.50, an advance of 50 cents over the figure of a month ago. Hydrated finishing lime, in paper bags, is available at the supply yards at \$24.00 a ton, delivered, while hydrated common, paper bags, is \$19.50, ton price.

The Bridgeport Sand & Gravel Co., Bridgeport, Conn., has been organized with a capital of \$20,000, to operate local sand and gravel properties. Ex-



tensive production is planned. The company is headed by Alfred Grasso and Samuel Zimmer, 217 Laurel Avenue, Bridgeport.

The Westerly Blue & Light Granite Co., Milford, Mass., has been formed with a nominal capital of \$6,000, to operate quarries in this section. James J. Murphy is president; and Antonio Monti, Milford, treasurer. The last noted represents the company.

The Mineral Potash Corporation, care of J. P. Andrews & Co., 514 Brisbane Building, Buffalo, is perfecting plans for the installation of quarrying machinery, crushing and grinding equipment, air compressors, pumps and other machinery at feldspar properties in this section. A fund of \$300,000 is being arranged for the entire development.

The Buffalo-Indiana Stone Corporation, Buffalo, N. Y., has been organized with a capital of \$20,000, to operate a crushed stone producing plant. The incorporators are R. H. Tift, J. E. Johnson and E. L. H. Nash. The company is represented by G. W. Wheeler, Brisbane Building, Buffalo.

G. W. Maltby & Sons Co., Buffalo, operating a stone yard at 21 Maryland Street, will commence the immediate erection of a new plant addition, estimated to cost \$5,500, exclusive of equipment.

With the commencement of the spring season, sand dredging operations have been resumed in the vicinity of Bordentown and White Hill, N. J., and a heavy production schedule is being arranged. The first company to commence work in this district for 1923 output, is the Philadelphia Transportation & Lighterage Co., 119 Walnut Street, Philadelphia, Pa., and it is planned to operate continuously throughout the months to come. Other dredges are also starting up, after a suspension since last December, and the scarcity of good river sand in past weeks in the Philadelphia market will now be a thing of the past. About 400,000 tons, gross, are reclaimed in the Delaware River annually.

The Newton Slate Corporation, Newton, N. J., has been formed under state laws with a capital of \$300,000, to operate quarries in this vicinity. Plans are being perfected for extensive development. The company is represented by the New Jersey Registration & Trust Co., 525 Main Street, East Orange, N. J.

Stone quarries in the vicinity of Altoona, Pa., are advancing production and an effort is being made to secure additional men. The labor situation is not of the best, and there is a keen demand for good operatives. Throughout Blair County practically the same condition exists; the quarries are running as close to 100 per cent as possible, while limestone works are on a like schedule, reflecting the marked activity in the steel industry. The limestone quarries form one of the primary lines of industry in this county.

The Chapman Slate Co., Bethlehem, Pa., is arranging for extensive operations at its quarries and has been stripping and uncovering with the use of a 70-ton steam shovel, probably the largest ever used in a slate quarry in the state. About 40,000 yards of stripping have been removed from some of the finest properties of the company. The company has tentative plans under consideration for the electrification of its properties, and will soon commence the installation of electric equipment for this purpose, including motors, transformers, controllers and other apparatus. It is expected to have the improvement completed in the summer or early in the fall.

The Emigsville Lime & Shale Co., Emigsville, near York, Pa., has tentative plans under consideration for the early rebuilding of the portion of its plant, destroyed by fire, March 8. Considerable equipment was damaged, including three large kilns.

The Washington Slate Co., Slatington, Pa., is planning for early resumption of production at its local quarries and machinery will be made ready for service at an early date. The company is said to have a number of large orders on hand.

There is a marked scarcity of labor for quarry service in Eastern Pennsylvania, and a number of the plants are giving considerable attention to the problem of securing full working forces for spring and summer operations. The situation is bringing about a condition of bidding for men and wages are due for an advance.

The John E. Baker Stone Co., Saginaw, near Mount Wolf, Pa., is maintaining regular production at its plant and plans to continue under a heavy production schedule for some time to come. A full working quota is being employed and large shipments are leaving the plant.

## Every Prospect Pleases

### Cement Plants on the Way to a Big Year of Production

Practically every mill in the Lehigh Valley section of Pennsylvania is on the producing list, looking forward to one of the greatest periods of activity ever experienced in the industry. The demand for cement shows no abatement; on the contrary, with spring business opening both in the building construction field and road-building line, there is a noticeable increase in immediate call, necessitating a large tonnage output, as well as call on the fair-sized reserves that the mills have been able to accumulate during the past few weeks.

Anticipating the demand for power that will be made by the mills in this section in early weeks to come, public utility companies have been active since the first of the year in building new transmission and distributing lines in this territory. The contracts made for power show the urgent necessity for this expansion. The Lehigh Navigation Electric Co. has a high-tension line in course of construction from Laury's to Egypt, and will supply a number of mills at the latter point; this is an interest of the Pennsylvania Power & Light Co.

The majority of the cement plants have now completed necessary machinery repairs and improvements necessary for the spring run, and immediate consideration is being given to essential working forces for desired capacity. Labor in this section, similar to other parts, is not only scarce, but growing scarcer; with the steel mills running full, and offering sizeable wage schedules for common labor, the men have easily found jobs, leaving a number of the cement plants in sore need for larger working forces, even though equal wages are being given. It is likely that labor from other sections will have to be imported into this district in a short time. The rail situation shows marked improvement and with the gradual lessening of the need for cars for coal, greater supply will be available for transportation of cement from the mills.

The Atlas Portland Cement Co., Northampton, Pa., has advanced production to practically a capacity basis at its local plants. Mill No. 3 has recently been placed in line with an out-

put of 10,000 barrels a day. The company gives employment to about 6,000 operatives at its different plants. Shipments are heavy and there is a noticeable improvement in export orders. Considerable production from the local plants is finding its way to the latter outlet. The neighboring mills of the company at Coplay are on the active list, giving employment to all available workers. The Atlas mills at Hudson, N. Y., Hannibal, Mo.; and Leeds, Ala., are all busy.

Harry J. Seaman, general manager for many years of the Atlas Portland Cement Co., at Northampton, Pa., died recently at his residence at Ventnor, N. J., aged 65 years. He was widely known and very popular in the cement industry. In 1892, Mr. Seaman became superintendent of the Atlas company, then in process of formation. Later he was made general manager of the Northampton works, and continued in this capacity. He was largely instrumental in perfecting the rotary process of Portland cement manufacture, and invented and commercialized a process of burning pulverized fuel, now used extensively in the industry. At the time of his death, Mr. Seaman was also vice-president and general manager of the New York & New England Cement & Lime Co.

The Coplay Cement Co., Coplay, has Mills B and C in active service, giving employment to a large working force. The first noted plant, B, resumed production early in March, following a brief curtailment for necessary repairs and improvements. Mill C has been operating steadily since January, when repairs were made here. It is expected to continue on the present capacity schedule for many months to come. Plans are under consideration for the erection of a housing development for employees on the site of the local baseball grounds. It is expected to build a first unit of 19 homes.

The Nazareth Cement Co., Nazareth, is running full at its local mill, with regular working quota, and is said to have sufficient orders on hand to insure production on the present schedule until well into the fall season. Heavy shipments of cement are leaving the works for Philadelphia, New Jersey and other eastern destinations.

The Alpha Portland Cement Co., Easton, Pa., is perfecting plans for improvements and extensions in its plant at Martin's Creek, Pa., for



greater efficiency and economy in operation. A new power house will be constructed and a waste heat system installed. The latter will utilize the waste heat from the large kilns to operate a 4,800 horsepower boiler. The electric plant will include a 6,250-kilowatt generator, with auxiliary operating machinery. It is said the company's decision to install its own power plant has been brought about on account of the high rates for service now being charged by the central station, which power, heretofore, has been used. The company is arranging an appropriation of more than \$1,200,000, for extensions and improvements in its plants in different parts of the country, to include the installation of considerable new equipment for more economic operation.

The Lehigh Portland Cement Co., Allentown, Pa., is maintaining operations under normal capacity at its various plants in the Lehigh Valley section. During the year just passed, the company attained the highest production in its history, totalling nearly 18,000,000 barrels. This output, incidentally, represents approximately one-eighth of the total cement production of the company. It is planned to have the new mill now in course of erection at Birmingham, Ala., ready for service at an early date, and the different units will be started up as soon as the machinery has been placed and tried out. This will make the sixteenth Lehigh mill in the United States. The company has recently increased its capital from \$18,000,000 to \$25,000,000, for general expansion and additional working capital. General Harry O. Trexler is founder and president of the company.

The Lawrence Portland Cement Co., Northampton, Pa., has advanced production to maximum at its plants in this section, including the Siegfried properties, and expects to continue under full blast for some time to come. Improvements and repairs have been made in machinery, and the mills are said to be in fine shape. The company recently gave an annual dinner at the Hotel Allen, Allentown, to superintendents, heads of departments and office employes, and it proved to be one of the most successful affairs yet held. It was followed by a theatre party at a local playhouse. This was the twenty-third event of its kind and a prominent feature in the annual inner-office activities of the organization. F. H. Smith,

president of the company was among those assembled. The affair was in charge of C. A. Porter, third vice-president of the company.

The mill base in the Lehigh Valley section holds at \$2.10 a barrel, and there is no indication of any immediate change. Spring call may cause a tendency towards higher levels, but it confidently hoped that the present figure can be retained with profit to the plants. At Hudson, N. Y., a figure of \$2.20 maintains, while a similar figure is being quoted by the Atlas company at Leeds, Ala.; La Salle, Ill., mills are furnishing material for \$2.05 at the plant, and Hannibal, Mo., figures stand at \$2.10. There has been advanced to \$2.00 a barrel at Universal, Pa., where the price recently declined to \$1.90. Other increases have been made during the past month at Buffington, Ind., to \$1.95; Steelton, Minn., to \$1.95; and Mason City, Ia., \$2.05.

The International Cement Corporation, Kansas City, Mo., has plans nearing completion for extensions and improvements in the former plant of the Bonner Portland Cement Co., Bonner Springs, Kan., recently acquired. The work will include the erection of new buildings and the installation of considerable machinery and operating equipment, and is estimated to cost close to \$1,000,000. The company is operating full at its different mills, and is said to be arranging for an unusually heavy spring production.

Cement mills in the vicinity of Kansas City, Mo., are now operating at 20 per cent greater capacity than at any time during the past year, and finding an immediate outlet for all manufactured material. It is expected that spring production will be maintained rigidly at the present figures, if not at advanced outputs. There is a heavy call from building supply companies throughout this territory, who, on the other hand, are being pressed for immediate deliveries.

William Evans, Bethlehem, Pa., and William T. Peters, Allentown, Pa., have purchased the quarries of the Imperial Slate Co., Wind Gap, Pa., from Norman B. Dreher, trustee for the stockholders. The new owners plan for the early operation of the property, and will install necessary machinery and equipment for this purpose. It is expected to give employment to a large working force.

## Busy Filling Orders

### Texas Producers Disposing of Capacity Output

By Our Dallas Correspondent

Sand and gravel dealers in Dallas, Texas, and vicinity report unusually good business, and with the coming of spring, material increase in the demand for these building materials is noted. Building operations in Dallas, Fort Worth, Houston and other Texas cities are unusually active at this time, and road construction and street paving are being done on a large scale. Sand and gravel in large quantities are being used and dealers and operators of gravel pits are being hard pressed to fill orders.

In Dallas the Medical Arts Building, an eighteen story poured concrete structure, has recently been completed. The Dallas Athletic Club 22-story building is to be started immediately, and several other buildings from eight stories to 20 stories are to be erected this summer. All these have created a big demand for gravel for building purposes in Dallas.

Most of the gravel for the Medical Arts Building was furnished by the Eagle Ford Gravel Company from its pits near Dallas and was washed and screened before using. This company was one of the first to equip its plant for washing gravel.

The J. Fred Smith Gravel Company, organized in 1912, however, has also installed gravel washing and screening equipment and is now able to deliver 15 carloads of washed gravel and 15 carloads of washed sand a day without working overtime.

The J. Fred Smith Gravel Company is one of the largest dealers in gravel in Dallas, and operates several large pits along the Trinity river. This company in a recent report showed that it had produced more than two and a half million cubic yards of material since it began operation in 1912, including 750,000 cubic yards road gravel, 1,000,000 cubic yards of railroad ballast and nearly 1,000,000 cubic yards of gravel for concrete construction, which has gone into some of the largest and most notable works of this section.

This company is now keeping all its equipment in its three pits busy all the time and reports orders booked

ahead. For a time this company was hampered in its operation on account of lack of cars, but for some months shipping facilities have been adequate.

The Olem Gravel Company, Vilbig Bros., Trinity Gravel Company, Hunter Ferrell and other companies in Dallas report that they are operating on full time and can keep up with orders with the greatest difficulty.

The Court of Dallas and City of Dallas, which operate their own gravel pits, are working to capacity. Both city and county are doing considerable paving of streets and highways, and gravel is being used in large quantities.

Griffin & Wooten, contractors, have opened large gravel pits in Howard County, near Big Spring, from which they are taking large quantities of gravel for road construction in Howard, Ector, Martin and Midland counties along the Bankhead Highway. The Texas & Pacific built a spur track of about one mile in length extending to the gravel pits just east of Big Spring. This firm has contract for graveling the 99 mile stretch of highway in the counties named, and the Texas & Pacific is hauling the gravel. Side tracks are placed on the main line at five mile intervals and gravel is being hauled from these switch points  $2\frac{1}{2}$  miles in either direction and distributed along the highway.

Gravel in Dallas is selling for \$1.50 to \$2.00 f.o.b. pits, and prices delivered on the job in Dallas range from \$2.50 to \$4.50, depending on difficulties encountered in making deliveries. Delivery by motor truck has been made somewhat difficult for the last three weeks on account of continued rainfall, and wagons and teams have been resorted to. Fair weather seems likely for the next few days, however, and activity in the truck deliveries is increasing.

A recent contract awarded at Orange, Texas, covering gravel for highway construction shows the range of prices in that section. The Evangeline Gravel Company of Vinton, La., offered 5,000 cubic yards of washed gravel at \$2.37 per cubic yard, f.o.b. shipping point, while the Gulf Gravel Company was low bidder on 10,000 cubic yards of pit run sand-clay gravel at \$1.70 per cubic yard f.o.b. cars at pits. This gravel is to be used in building the highway from Orange to Vinton, La.



Several new companies to deal in sand, gravel and crushed stone have been organized in Texas recently, showing the increasing business in these materials.

The Incorporated Gravel Company of Dallas has been organized with a capital stock of \$2,100. Incorporators are: E. B. Cantrell, A. E. Doss and A. N. Gorenbreth, all of Dallas.

The Harston Sand and Gravel Company has been organized with a capital stock of \$120,000 to operate gravel pits and deal extensively in sand and gravel. Incorporators of the company are: Dan S. Harston, W. E. Callahan, J. H. Smith and others.

The Urbana Gravel Company of Urbana, San Jacinto County, Texas, has filed an amendment to its charter enabling it to enlarge its business. The name was changed to the Urbana Sand and Gravel Company, to permit operations in sand as well as gravel, and the capital stock was increased from \$30,000 to \$50,000.

The Texas Cement Plaster Company of Hamlin, Texas, filed an amendment to its charter increasing the capital stock from \$64,000 to \$512,000.

Stockholders of the Southern Stone and Marble Company of Yoakum, Texas, held their annual election, at which the following officers for the company were chosen: Philip Welhausen, president; William Green, first vice president; W. L. Burton, second vice president; C. L. Moore, general manager, and E. C. Koerth, secretary.

The Rockford Sand and Gravel Co., 1132 N. Court St., Rockford, Illinois has been incorporated with a capital of 200 shares of no par value. The incorporators are Rea Hurt, Fred H. Carrice, S. A. Gibson. Correspondents: Passet, Abbott and Hughes, 1st Natl. Bank Bldg., Rockford.

The Wisconsin Sand and Gravel Company, Milwaukee, Wisconsin, was declared solvent by Circuit Judge Lawrence W. Halsey, who set aside the order he made on January 22nd, providing for appointment of a receiver for this company. It was shown before the court that the company is not insolvent and that under the present management is able to continue in business. The company was incorporated in 1915 and is capitalized at \$90,000. According to a report made in 1921 its assets were \$174,499.

## Of Course Lime Pays

### North Carolina Has Proved It Again in Five Year Rotation

Excellent results have been secured in a test made with ground limestone in a five-year crop rotation on the red clay loam soils of the Piedmont Branch Station farm near Statesville, N. C., reports E. C. Blair, extension agronomist for the State College and Department of Agriculture. Mr. Blair has recently secured the results of a test conducted by W. F. Pate, soil agronomist for the Agricultural Experiment Station. Mr. Pate applied two tons of ground limestone per acre in the spring during the first year of the rotation.

The land was then placed to corn and the limed area produced 43 bushels per acre while the unlimed area produced only 35.5 bushels. This difference of 7.5 was not much for the first year. The second year, the land was in wheat. The limed area produced 14.1 bushels, while the unlimed produced 11.4, a difference of only 2.7 bushels.

Not much effect shown yet—but here is the third year, when red clover was on the land. The first crop was turned under and this was the second crop to be cut and used for hay. The limed area produced 3,104 pounds of hay, while the unlimed area produced only 829 pounds and most of this was weeds. This is a difference of 2,275 pounds of hay from lime applied three years before.

The fourth year the limed area produced 1,350 pounds of seed cotton and the unlimed produced 1,302 pounds, and the fifth year the limed area produced 50.2 bushels of corn while the unlimed area produced only 38.6 bushels. This was an increase of 11.6 bushels as compared to the increase of 7.5 bushels secured the first year the lime was applied.

Mr. Blair states that this experiment shows beyond all doubt the beneficial effects to be secured from the proper use of limestone, especially in the growth of legumes and the resulting effect on the crops that follow.

The Lake Shore Sand Company of Chicago has increased its stock from \$20,000 to \$200,000.

## Winter Was Eventful

### Its Mildness Encouraged Much Building in Cincinnati District

By Our Cincinnati Correspondent

The past winter, unusually mild and conducive to winter building, has proven an eventful period for the sand, and gravel producers in the southern section of Ohio. Building permits were issued in large numbers, and winter construction was prosecuted to a larger extent than in past years. Although most of the sand and gravel pits in this section were not producing and current supplies were taken from stock piles, entailing additional charges of 25 cents per ton on deliveries, yet a noticeable amount of actual winter pit production by a few producing concerns of year round operation was in effect, and enjoyed by the consuming trade.

The outlook in the latter part of March seems certain to foretell of a favorable April and the coming season. Prices continue firm in all basic materials, in cement, lime, and gypsum as well. It has been stated that the well supplied market alone, has prevented additional price raises. No specific changes are in effect, although it is predicted among the trade that if spring demands increase as in the past an upward trend in prices may be expected, and at no distant date either. The increased quotations of last month continue as the present market prices. Washed gravel at \$1.50 a ton, f. o. b. cars, sand at \$1.20 per ton, f. o. b. cars, and crushed boulders at \$1.65 a ton, are current values. Including the barrel, cement sells for \$2.99 a barrel, and lime is quoted at \$15.80 per ton, with mason's lime a little lower, selling at \$13.30 f. o. b. cars. A few sand and gravel producers are selling at a variance from the sand and gravel supply house prices. One prominent pit operator quotes good sand from tipples at 10 cents lower than the supply houses, and wholesale quantities of washed gravel are sold at 15 cents less per ton than the prominent dealers' quotations. Around the first of April or shortly thereafter sand, washed gravel, and crushed boulders will be sold at prices, which will not include the regular seasonal charge of 25 cents for drawing from stock piles.

All supply houses are handling a good volume of business, and they are contracting with building operations for the complete life of the job in all basic material except cement. On account of the mill distribution and smaller supplies of cement no long period bookings are justified.

The latter part of March witnessed the letting of a number of small road repair and building contracts by the County commissioners of Hamilton County. These were the first appropriations in a number of months for road work in this section of southern Ohio.

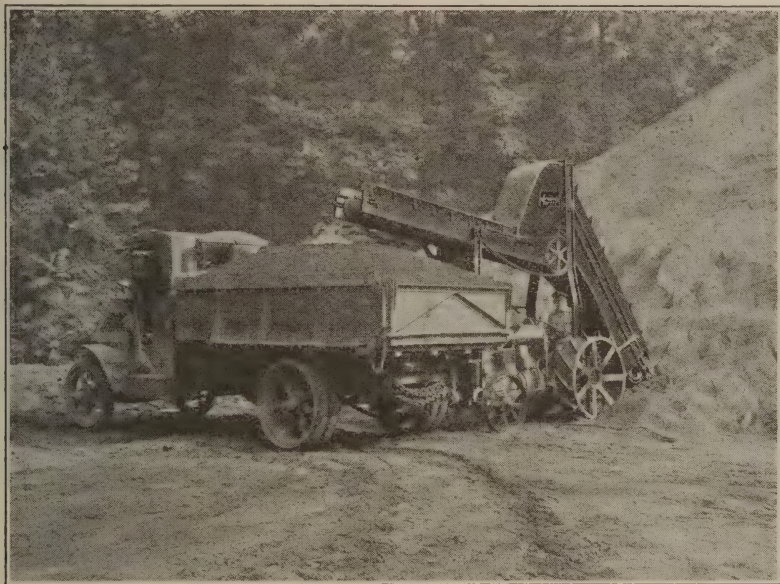
Attesting to the fact that a few local pits are and have been doing winter work is the case of the Red Bank Gravel Company, whose operations include three plants of 1,000 tons per day capacity. F. W. Cornell, owner, announces that he is working his diggings to the tune of 60 per cent production, increasing this each week. Mr. Cornell is experimenting with a new idea of building concrete tunnel chutes under the tipples so that when the tipples are full, the overflow may be put on the ground for storage and handled with advantage. Mr. Cornell expresses optimism in the future road building work. He was one of the first in this locality to prove the expediency of building concrete roads in place of the macadam process, and is now supplying a number of road contractors with materials.

Mr. L. G. Wilde, of the Cincinnati Builders' Supply Co., has done a good volume of business the past month and anticipates even greater future markets, with the possibilities of resulting higher prices. The company is well supplied with materials but is experiencing renewed railroad car shortage troubles. The Cincinnati Builders Supply Company is booking quite a number of long time contracts.

Mr. J. E. McCracken, of the J. E. McCracken Supply Co. is getting top prices in face of an unusual good demand for materials. Some difficulty has been encountered by the firm in securing cement shipments, and on account of the railroad situation none of this material is supplied from the Lehigh Valley district, but all cement is shipped from the Ohio mills who are working at high speed to supply the strong demand.

High water on the Ohio river has handicapped the production of the river operators the past month. The





T. J. Hall Company report a large volume of business the past month and a firm future market. Their subsidiary, the Ohio River Sand and Gravel Company, is preparing for spring building supplies. The local river output is an economical material serviceable for every use except concrete finish.

A large tooth measuring 10 inches long,  $5\frac{1}{2}$  inches high, and weighing approximately 15 pounds was found in the sand and gravel pit of Joseph N. Dugan this month. Geologists of the University of Cincinnati aver that it is the tooth of a mammoth of the glacial period, and have had the tooth shellacked and turned over to the Geology Department of the University.

Two companies in Ashland, Ky., received papers of incorporation the past month. The Ashland Limestone Company was incorporated for \$100,000 by R. P. Hill, Jr., M. E. Posey, and W. S. Hoge, Jr. The Ashland Sand and Gravel Company was incorporated for \$100,000 by G. A. Northcutt, Huntington, W. Va., and W. P. Wheeler of Ashland.

The Ladwig Sand and Gravel Co., Milwaukee, Wisconsin, has been incorporated with a capital of \$25,000. Otto Ladwig, Otto Ladwig, Jr., and Walter Ladwig.

## Fordson Loader

A loader which uses a Fordson tractor as its propelling and operating power is being sold by the Specialty Engineering Company, Allegheny and Trenton Aves., Philadelphia, Pa.

In addition to a chain and bucket elevator, this loader has a conveyor boom for the more convenient loading of wagons and trucks, as shown in the illustration.

The installation is a comparatively simple operation, which can be performed in a few hours' time at any reasonably equipped Fordson service station. The rear supporting members terminate in cast steel saddles, which are strapped around the rear axles in the grooves already provided. This makes an integral part of the tractor. The equipment is driven from the power take-off shaft of the Fordson, a spocket wheel being furnished to replace the customary drive pulley. A clutch is also provided on the countershaft so that the loading equipment may be stopped or started in conjunction with the tractor clutch. A pair of jack screws are provided at the lower end of the elevator, so as to give road clearance when the equipment is moved.

## Quarrying by Mining

### Virginia Operator Now Using This Method With Good Results

There is possibly nowhere a more interesting rock-quarrying operation than that of the Princess Iron Corporation at Craigsville, Augusta County, Virginia. This quarry was secured by the corporation in 1915 for the purpose of supplying its Glen Wilton, Virginia, blast furnaces with high-grade calcite flux. For several years it was operated as an open-pit quarry, but in 1919, when the face became worked up to a height at which the overburden of earth and a seam of shaly limestone would have required very extensive stripping, the management decided to mine the stone underground by means of a series of tunnels driven in the face of the quarry, thereby escaping the expense of heavy stripping.

The quarry face at this time had reached the height of ninety feet and was still getting higher.

Tunnels were driven at distances of from 75 to 100 feet apart in the face of the quarry, which forms a crescent about 600 feet around. These tunnels or underground quarries were driven by keeping headings shot forward at the top and working down in benches. The tunnels are from 30 to 50 feet high, and from 20 to 36 feet wide at the entrance, gradually widening out and becoming higher inside. Some of them now extend a distance of 300 feet and several are 80 feet high and 100 or more feet wide. As work progresses some of these tunnels will be merged, thereby making a large underground quarry. Pillars are left standing at certain distances to support the overburden, a practice similar to that followed in coal mining. Thus, underground amid surroundings not unlike those found in many mines of the anthracite region, the quarrymen and their helpers are every day drilling and blasting and loading calcite instead of coal.

Quarrying or mining stone in this way would seem to be an expensive operation as compared with open-pit quarrying, but it has not proved so with the Princess Iron Corporation. As the need here is for a high-grade limestone flux, free from dirt, this

method of quarrying assures an absolutely clean product without the necessity of washing or picking. Stripping is entirely eliminated. Bad weather has no effect on the workers underground, and no time is lost on that account.

This quarry has a daily capacity of 500 tons of furnace flux stone and 250 tons of crushed commercial stone.

Du Pont explosives and blasting supplies are used exclusively by the Princess Iron Corporation and have contributed not a little to the success in this interesting and unusual quarry operation.—Du Pont Magazine.

## All Depends on Supply

### Material Market Will Be Limiting Factor in Construction

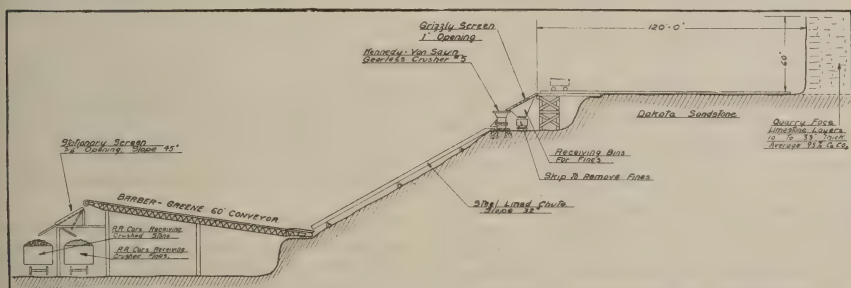
In the first 10 weeks of this year, says Allen E. Beals of the Dow Building Reports, New York, more orders for basic materials, appliances and equipments for this year's consumption have been placed, judging from the current volume of building operations as daily reported, against those reported for a similar period last year, by almost a third. If the present rate of placement of building material, appliance and equipment orders continues, manufacturing schedules for Eastern seaboard markets will have to be increased at least by 40 per cent. Some of these manufacturing schedules have already been increased.

Portland cement, the first to feel the pending pressure for building material supplies from a national point of view, has increased its 1923 manufacturing schedule from 123,000,000 barrels output to nearly 150,000,000. Seven new mills are being put in shape to meet the demand this year. Orders per day have been for some time almost double what they were at this time last year.

The dominating idea is that unless building materials can be produced in sufficient quantities to meet approximately the current demand, the demand itself will be automatically checked by any marked price advance to inability to meet the markets call.

If a sentence slogan should be called for to typify this year's building construction policy with a view to preserving the boom the most succinct would be "Keep the Market Steady." A general average price change upward will





certainly check demand. A general average price reduction, at this time would prolong, instead of stimulate, demand and some lines, sensing this most unusual building construction market trend, have led the way.

Cement was expected to advance earlier in the year. It is not likely to do so now. In fact, the tendency has been downward, rather than upward since last September. Taking cement as a fairly representative basic building material price fluctuations since June 23, 1920, follow based upon net prices exclusive of bag rebates:

|                        |        |        |        |
|------------------------|--------|--------|--------|
| June 23, 1920.....     | \$2.25 | \$2.35 | \$2.65 |
| July 19, 1920.....     | 2.50   | 2.60   | 2.90   |
| December 3, 1920.....  | 2.30   | 2.40   | 2.70   |
| January 27, 1921.....  | 2.00   | 2.10   | 2.40   |
| September 15, 1921.... | 1.75   | 1.85   | 2.10   |
| November 22, 1921....  | 1.60   | 1.80   | 2.00   |
| May 17, 1922.....      | 1.80   | 1.90   | 2.10   |
| August 4, 1922.....    | 2.00   | 2.10   | 2.30   |
| September 2, 1922....  | 2.25   | 2.35   | 2.55   |
| October 17, 1922.....  | 2.00   | 2.10   | 2.30   |
| February 27, 1923....  | 2.00   | 2.10   | 2.30   |

## Conveyors Load from Crusher to Car

The above illustrations show the method employed to load cars in the plant of the Orman Crushed Rock Company, near Pueblo, Colo.

Here a Barber-Greene conveyor is used as a stationary piece of equipment.

It discharges onto a screen, separates the stone and the fines, discharging into different cars.

Mr. Reed, superintendent, reports that the conveyor handles an average of 250 cubic yards a day from crusher to cars, and that the conveyor is not being worked to capacity.

Yadkin Gravel Company of Lilesville, N. C., has been incorporated with a capital of \$50,000. Adlai Osborne, O. H. Roberts and T. T. Patterson, Charlotte, Incorporators.

## Prepare for Big Output

### Pittsburgh Operators Getting Equipment Ready for That Purpose

By Our Pittsburgh Correspondent

With operations gradually curtailed during the final weeks of the winter period, the spring season among the sand and gravel producers at Pittsburgh, Pa., is destined for heavy activities. The different companies are making ready for large production, putting the dredgers and tugs in shape for this purpose. The demand for the output continues unabated, and orders are piling up for deliveries at the earliest possible date.

Prices show little, if any change, and there is marked stability and firmness in quotations. Washed gravel in wholesale quantities holds at \$1.60 a cubic yard, f.o.b. float, while delivered on the water front, the material is priced at \$2.00. Gravel delivered on the job varies from \$2.25 a cubic yard upwards, according to length of haul. Sand is in good demand at substantially the same levels as gravel; first grade material is procurable at \$1.50 f.o.b. float, and slight advance for delivery on the waterfront. Reserve stocks have gradually been depleted, and efforts are being made to replenish the supply. Crushed stone is selling at \$2.85 a cubic yard, wholesale, in the local market, with dealers asking \$4.50 for delivery on the job. Portland cement shows an advance from \$2.14 to \$2.24 a barrel at Pittsburgh, in carload lots, f.o.b. city, without bags. The material is operating under a heavy call. Dealers are quoting \$3.25 a barrel for cement, delivered to destination.

The Central Sand & Gravel Co., Memphis, Tenn., has come to Pittsburgh for the construction of an all-steel barge, and a contract for the boat has been given to the Dravo Contracting Co. The work is now in progress. The barge will be 36 ft. wide, 175 ft. long and 8 ft. deep, and will have a capacity of 1,200 tons.

The Iron City Sand Co., Pittsburgh, has been active on the river with its towboat "Iron City" and sizeable quantities of sand and gravel have been hauled to the local port. The dredgeboat "Monarch," is producing in

the Allegheny River, and following recent repairs is now in fine shape. The company's landing on the lower Allegheny River has been a busy point in connection with advance spring operations.

The Rodgers Sand Co. has been using its dredgeboats on the river, with steamers "Sweetcake" and "Twilight" active in hauling barges of sand and gravel to Pittsburgh and other nearby points, including Clairton, where heavy disposition has been under way. The towboat "Margaret" of this company's fleet will also be engaged under extensive distribution during the spring. The company has been making necessary boiler and equipment repairs, and tows are now in excellent shape.

## Versatility of Operation

The Bay City Dredge Works, Bay City, Mich., has just issued a bulletin on its Model 16 crane excavator.

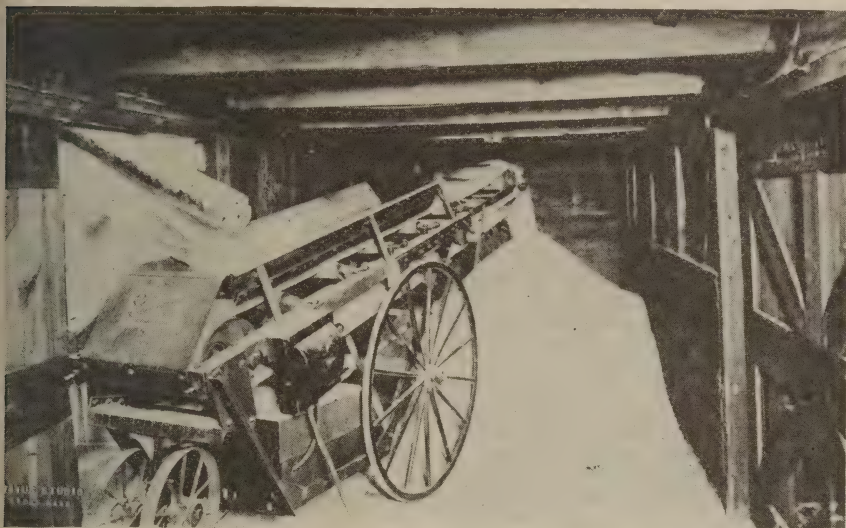
This bulletin shows this piece of equipment to have unusual versatility, being adaptable either to a skimmer scoop for stripping, a dragline operation, a clam shell operation, or with a regular shovel dipper.

The circular tells the whole story.

The Uehling Instrument Company, Paterson, N. J., has just appointed two new agents, namely John E. Arnold, 15½ South 4th Street, Tulsa, whose territory is the State of Oklahoma, and H. R. N. Johnson, 917-A Marquette Ave., Minneapolis, whose territory is Minnesota, North Dakota, and South Dakota. Both of these agents are well acquainted in the power plant field, and are thoroughly conversant with the problems necessitating the use of Uehling Co. recorders and other Uehling gauges. The Uehling Chicago Agent, Walter C. Lane, 20 West Jackson Blvd., recently returned to the Chicago territory after two months spent at the Paterson Plant assisting in the development of the new Uehling Co., or combustible, recorder.

Extensive improvements are being made at the plant of the Hudson River Trap Rock Company at Marlborough, N. Y., which is expected to open about April 1st. An expenditure of over \$200,000 has been made for new machinery and equipment, which includes six crushers, two steam shovels, four gasoline locomotives and 25 cars.





Box Car Loader in Operation

### Box Car Loader

A box car loader which will operate inside of box cars, is manufactured by Barber-Greene Company, Aurora, Ill.

In less than a minute this loader can be reduced to a minimum length of 8 feet, in which form it will easily turn around inside the box car.

When extended, the discharge end of the load is high enough to enable the machine to throw the material well up against the end of the car.

The belt speed is somewhat higher than that of the ordinary conveyor, which gives it good throwing capacity. The belt is fitted with cleats so that it can be operated on a high angle.

### Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,446,389. Excavating-bucket. Henry C. D. McGrew, Los Angeles, Cal.

1,446,753. Crusher. Joseph E. Kennedy and Charles L. Carman, New

York, N. Y.; said Carman assignor to said Kennedy.

1,447,332. Power-shovel. Edwin J. Armstrong, Erie, Pa., assignor to Ball Engine Co., same place.

1,447,355. Screening machine and method. Herand K. Najarian, Salt Lake City, Utah.

1,447,970. Washing and screening apparatus (for gravel). Raymond W. Dull, La Grange, Ill.

1,448,013. Crushing and grinding machine. James A. Warren, Denver, Colo.

1,448,103. Mine-car. Samuel A. Worcester, James L. Bruce, and Leroy S. Farnham, Butte, Mont.

1,448,212. Excavator. Leslie P. Green, Chicago, Ill.

1,448,310. Apparatus for grading and washing heavy material. Eugene D. Merwin, Seattle, Wash.

1,448,537. Mechanical shovel. Samuel Hoar, Virginia, Minn.

1,448,596. Sand-cleaner. John Kovach, East Chicago, Ind.

1,448,628. Feeder for ball-mills. Oscar H. Johnson, Denver, Colo., and Henry F. Webb, Salt Lake City, Utah, assignors to Mine & Smelter Supply Co., Denver, Colo.

1,448,668. Coal-jig. Moro P. Lewellen and Harry S. Arnold, Camden, N. J.

1,448,680. Drag-line excavator. Alexis P. Steele, Statesville, N. C.

## A Pioneer Passes

When the announcement of the death of Harry J. Seaman appeared in the daily press, a host of friends paused in retrospect and realized, many with surprise, that a great leader and pioneer had died. An unflinching courtesy which had endeared him to his colleagues and subordinates, and a most retiring modesty, had militated against a popular appreciation of his excellent work.

He was graduated in chemistry from Lafayette in 1879, and with 13 years of experience in metallurgical work he came in 1892 to be superintendent of the Atlas Portland Cement Co., which was then being organized. During his first years in the cement industry many costly experiments were being made in an attempt to use oil for firing the kilns, and Mr. Seaman, with an associate, an English engineer named Hurry, began a series of experiments on the use of pulverized coal in cement burning. There was something approaching the dramatic in the application of these experimental runs to plant work. A large plant was constructed, using pulverized coal as a fuel, but the plant was also equipped with oil-burning appliances as a precautionary measure and to some extent to throw competitors off the trail. The operation of this plant was carried on for 2 years before many of the competitors realized the secret of its success.

During the 22 years in which Mr. Seaman was at the helm of the Atlas, the company grew from a small industrial plant of seven kilns to the huge organization operating 103 kilns with a combined output of 50,000 bbl. a day. This in 1914 made it the largest cement plant in the world. A severe illness then robbed Mr. Seaman of his energy and for 2 years he had virtually retired from active work. But during the war he was instrumental in the installation of potash-recovery systems to remove the potash from the cement kiln dust and he combined this process with waste-heat boiler installation and a complete elimination of flue dust from the kilns.—Chemical and Metallurgical Engineering.

The McAnge Lime Corporation, has been organized at Suffolk, Va., with a maximum capital of \$25,000. W. N. McAnge, president; H. McR. Pinner, secretary and Peter Smith, all of Suffolk.

## A Correction

Our attention has been called to the fact that an article in our February issue describing the plant of the Krippeford-Tuttle White Cliffs Products Company, at White Cliffs, Ark., was inaccurate in some details.

Nearly all such articles are written by our own staff, from personal inspection; but this one unfortunately was not so prepared.

As now operating, the plant is equipped with a No. 6 Mammoth crusher handling material as large as 36 inch cube, breaking it down to 1 inch and finer at the rate of 75 to 100 tons per hour; also a No. 4 Jumbo to reduce the 1 inch material to  $\frac{1}{2}$  and finer at the rate of 40 to 50 tons per hour.

These were installed by the manufacturers, the Williams Patent Crusher and Pulverizer Company of St. Louis, who also acted as advisory engineers.

## Safety Engineers to Meet

A mid-year safety conference has been called by the Engineering Section of the National Safety Council at Chicago, Ill., April 17, in the auditorium of the Western Society of Engineers, 53 W. Jackson Blvd. Handling material, dust and fume hazards, and traffic safety are the three main topics on the program.

The morning session will deal with causes of accidents in handling materials, and use of conveyors and trucks in eliminating material handling accidents, followed by a general discussion of specific safety problems in material handling. George T. Fonda, of the Fonda-Tolsted, Inc., Washington, D. C., chairman of the Engineering Section of the Council, will preside at the morning meeting.

Preventing dust fires and explosions, health protection against dust, and a discussion of practical methods of dust and fume removal will follow in the afternoon. Homer E. Niesz, Commonwealth Edison Company, Chicago, and treasurer of the National Safety Council, will preside at the banquet in the evening at which traffic problems will be discussed.

The Bridgeport Sand and Gravel Company, Bridgeport, Conn., has been incorporated with a capital of \$20,000.



## In Midst of Activity

### Kentucky Producers Tuning Up For Big Spring Business

By Our Louisville Correspondent

There is a very lively air all around among both the stone people and the sand and gravel folks in the Louisville territory these days. The crushed stone people have been overhauling and tuning up their equipment lately and at this writing they are figuratively rolling up their sleeves and spitting on their hands to make things hum during the spring season, especially where highway contracts are involved. This highway work too, is expected to be a big feature of quarry and crushing operations in Kentucky this year.

The sand and gravel people have already gotten into the midst of spring activity and have been busy as bees all through the month of March. The winter demand was of such unusual volume that practically all of them had to get out and take chances on cold weather and ice and get on the job with their river work earlier this spring than usual.

The E. T. Slider Co., finding itself running short of gravel at the local yards here, got busy with that big jumbo digger in the river the latter part of February and have been very busy ever since, not only in the river work but also in local deliveries. They have had a surplus of sand right along but have had some shortage of gravel all winter and this started the digger crews to work a little earlier than usual in the present season.

G. E. Lloyd, manager of the Louisville yard of the E. T. Slider Co., says that the local trade in sand and gravel has been fine and that while it is early yet for car lot business out in the state this is showing signs of activity now too and all told it looks like we are to have a big spring season.

The Ohio River Sand Co. say that they started their river operations the first of March. This is a little earlier than usual but they had to get out because of reducing stocks on the yard to supply the winter and early spring demand. They report a splendid volume of winter and early spring business, that has kept them hustling right along and they look hopefully for a

good carlot business too. Indeed this concern has enough faith in the situation that it has been busy lately equipping a new elevator plant which will be ready for operation the first of April. Meantime they are busy all around and it looks like a record-breaking spring season.

R. B. Tyler is at this writing down in Florida on a vacation trip. William N. Bosler, engineer for the R. B. Tyler Company, when asked for news of what it is doing among their crushing plants and road contracts, said that they have not been doing much crushing the past month but have confined their efforts to some grading and preliminary work and meantime have been overhauling their crusher equipment and getting ready to go. It looks to them like a busy season and they figure on going to it the latter part of March and keeping busy all spring and summer. There is plenty of work in sight; so much work, in fact, of all kinds that there is some scarcity of labor and the indications are that those with crusher plants and road contracts will have to pay higher for help this year and will therefore need to revise their figures upward on labor cost of operations. This is the outlook at least for the spring months. What may happen later will depend considerably on whether or not building operations continue at their present lively rate.

Though seemingly an unrelated matter there is really a good item of news for the trade here in the fact that the western Kentucky coal operators and miners signed a wage scale agreement in Louisville March 15th to continue effective a year from April first. This is not only good news from the viewpoint of it insuring continued operations of coal mines and therefore an available supply of coal, but it is good too in that no wage advances were involved. The old scale was agreed to unanimously, and while this seemed high a year ago, it is a different matter today in the face of the insistent demands for higher wages on the part of many in the building trades who were already getting a wage rate comparable with that of the coal miners.

The Carrico Stone & Lumber Co., the Rockford Sand & Gravel Co., and Hart & Page have consolidated to form the Northern Illinois Supply Company of Rockford, Illinois. The company is capitalized at \$600,000.

## Heil Distributors

The Chicago offices of the Heil Company have been moved from their former location 2718 Wentworth Ave., to their new place 2422-26 Cottage Grove Ave. The new service and sales room of the Chicago Heil distributors has three times more floor space than the old offices.

Twenty men are employed at this Chicago service station to mount the Heil hoist, Heil body and the Heil Quality tank equipment.

According to H. F. Kneppreth, manager of the Chicago branch, the Heil line of truck equipment is enjoying a brisk business in Chicago. He says there is a very great demand in Chicago for the Hydro hoist. Mr. Kneppreth is assisted by Joseph Wais.

The Heil Company of Milwaukee has established daily truck service from Milwaukee to Chicago. This service enables customers to get immediate delivery on their orders.

The home office of the Heil Company has also announced a change of address in the New York distributing station. The Motive Parts Corp., Heil distributors in New York territory, have moved from 136 West 55th St., to their new offices, 796 10th Ave., near 53rd St.

The H. P. Wilson Co., of Denver, Colo., has recently been engaged as the Heil distributor in that district. The office of the Wilson Co., is at 17th and Blake St. They are able to give complete service on all Heil equipment.

## All About Explosives

We are in receipt of the first issue of a delightful new magazine—the "Explosives Engineer" published by the Hercules Powder Company, Wilmington, Del., and edited by Harry Roberts, Jr., and N. S. Greensfelder.

The new publication is delightfully gotten up in every detail and promises to be a very satisfactory presentation of the explosives industry from month to month, both in pictures and text.

One interesting feature of the present number is a four-page section, principally of photographic reproductions, showing explosives investigations being carried on by the United States Government. Another section shows reproductions of oil paintings, made especially for this publication, showing incidents in the coal mining industry.

## Changes in Westinghouse Branch Offices

Several changes in the branch offices of the Westinghouse Electric & Manufacturing Company have been announced by W. S. Rugg, general sales manager of that company.

Two of the changes concern the managements of two offices, the Baltimore and Huntington, W. Va., branch offices. C. V. Woodward has been appointed manager of the former office and F. C. Reed has been made manager of the Huntington office. R. J. Ross has been appointed assistant manager of the transportation division of the Philadelphia office and W. F. James has been appointed manager of the industrial division of the Philadelphia office, succeeding R. F. Moon, who has resigned to accept the vice presidency of the Atlantic Elevator Company, of New York.

## Announcement

The Charter Gas Engine Company of Sterling, Ill., announces the purchase of the entire Mietz oil engine business, heretofore carried on at 128 138 Mott Street, and 430 East 19th Street, New York, by the August Mietz Corporation and the Reliance Oil Engine Corporation. This effects a merger and consolidation, under one management, of two of the oldest and best known internal combustion engines in the world.

The Charter Gas Engine Company is now moving from New York City to its plant at Sterling, Ill., all of the physical assets comprising the Mietz engine and in the meantime is filling no repair orders from New York, so that there will be no interruption in repair service.

## Belt Fasteners

A bulletin which tells in detail a great many things about belt fasteners is published for free distribution by the Bristol Company, Waterbury, Conn.

This company makes metal belt fasteners of several different styles, all illustrated in the bulletin, together with their method of application.

The Ashland Sand and Gravel Company, Boyd, Ky., has been organized with a capital of \$100,000. G. A. Northcutt, Huntington, West Va., and W. P. Wheeler and C. McLester of Ashland.



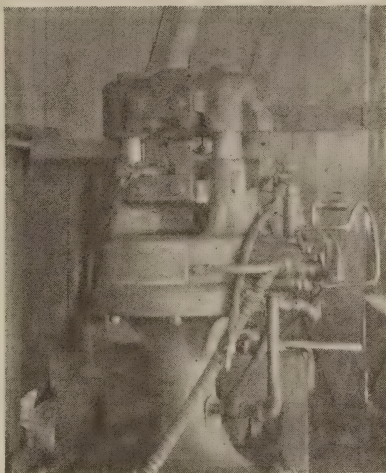
## Convenient Drill Sharpening

At the quarry of the Virginian Limestone Corporation described elsewhere in this issue, has been developed a very good plan of conveniently handling drill sharpening problems. Before this plan was put into effect one of the big jobs around the quarry was that of running the steel between the drills and the machine shops and back again. Too many men were employed at this, and the one item of carrying the steel added too much to the drilling cost, resulted in too much confusion and hampered the operating of the drills, and in addition to this, imposed too great a burden on the shops.

Mr. Bobbitt, superintendent of the Virginian Limestone Corporation, figured a way out of this difficulty. He took an old Vulcan shovel for which the company had no use, stripped it of machinery, patched up the body and mounted on it all the necessary drill sharpening equipment. This "traveling machine shop" is equipped with a forge, anvil, Ingersoll-Rand air-driven drill sharpener, and such tools and small appliances as are necessary to handle the work conveniently.

As the steam shovel's regular railroad trucks were left on this traveling shop, it can be hauled to any location that is most convenient at any particular time. Thus the distance from the point where the drilling is done and the point where the drills are sharpened is always the shortest possible distance and the steel is conveniently transported between the two places. There is one distinct advantage in the fact that the regular machine shop is relieved of all this work which is now handled in the shop that has facilities installed wholly with this idea in mind. The only connection between the traveling shop and the plant is an air line that is run out from the compressor.

Producers who have a problem similar to this one of the Virginian



Ingersoll-Rand Drill Sharpener on "Traveling Machine Shop"

Limestone Corporation, may see in this solution, a solution of their own difficulties.

The Walter A. Zelnicker Supply Company of St. Louis, Mo., have moved their offices from 325 Locust St., where they have been located for the last twenty years, to the Chamber of Commerce Bldg., 511 Locust St. The main plant and yards of this company in E. St. Louis, now cover fourteen acres:



The Virginian Limestone Corporation's "Traveling Machine Shop"

## S. and G. Activities

### Association Working Out Program for Benefit of Producers

By Our Washington Correspondent

Activities planned for the National Sand and Gravel Association during the present year, although not yet completely worked out, include an energetic and wide-spread campaign for the use of suitable materials. In this campaign it is hoped, according to Secretary T. R. Barrows, to educate builders to the value of high-grade materials. If this campaign is successful it will eliminate the dishonest producer as well as the one who is incapable of delivering materials of a grade that should be used.

One of the prime duties, however, of the association's headquarters in this city will be to work constantly toward a reduction in car shortage. This shortage has developed since this time last year when there was a car surplus of 278,481. At this time there is a shortage of approximately 72,855 cars, which means that the industry is beginning to feel a lack of sufficient cars. In connection with the efforts of the association's headquarters to keep the industry supplied with cars, there is also being conducted among the members of the association a campaign to "ship now." With this campaign on and with the fight which the association's headquarters is making against a car shortage it is hoped by Secretary Barrows to be able to keep building materials moving during the Spring season.

At the same time headquarters here is developing for the benefit of the members a comprehensive, yet simply and easily applied, uniform cost accounting system. The work on this system is rapidly progressing, and it is believed by Mr. Barrows that when it is put into operation by the members it will prove one of the most valuable adjuncts to their business. Such a system is growing and is fast becoming an urgent need of every member.

In connection with the present shortage of cars, it is stated by Secretary Barrows that it is daily becoming evident that the industry must be alert during their entire shipping season in

order to insure an equitable supply of cars. It is not believed now that the Interstate Commerce Commission will again issue priority orders, but whether or not this is done it will be necessary for the members of the association to be constantly insisting upon a share of the cars that are available.

The "ship now" campaign has the endorsement of the Bureau of Public Roads and of various state highway commissions. It has resulted, Secretary Barrows states, in a better movement of materials and it is the belief that if the membership stands solidly back of the movement that material will be prevented from piling up at the points of production. In connection with this movement it is urged that members of the association get into touch with their customers, either personally or by letter, and frankly lay before them the true situation as regards car supply. It is felt that if such a course is taken buyers will aid the producers in getting the material away from the plants.

Reports to the Bureau of the Census, just made public, give the value of leather belting; belting and hose, other than leather, and of asbestos products manufactured during the year 1921, for which the census was taken.

In the case of leather belting, it is reported that the manufacture of that product amounted to \$15,727,000 in 1921, as compared with \$40,481,000 in 1919 and \$23,036,000 in 1914, a decrease of 61.1 per cent from 1919 to 1921, and of 51.7 per cent for the seven-year period, 1914 to 1921. In addition, tanners and establishments assigned to other industry classifications reported leather belting as a finished product to the value of \$4,948,000 in 1919 and \$738,000 in 1914; corresponding figures for 1921 are not available at this time. Statistics for establishments with products valued at less than \$5,000 are not included in the figures for 1921.

The value of products of establishments engaged primarily in the manufacture of belting and hose where the material was chiefly cotton, linen, or canvas amounted to \$6,390,000 in 1921, as compared with \$19,176,000 in 1919 and \$4,441,000 in 1914, a decrease of 66.7 per cent from 1919 to 1921, but an increase of 43.9 per cent for the seven-year period 1914 to 1921. Several important establishments in this industry in 1919 had changed the character of their operations in 1921 and were assigned to other classifications.



# Mining Diatomaceous Earth

By E. D. GARDNER

Mining Engineer, U. S. Bureau of Mines

A large deposit of diatomaceous earth or kieselguhr is mined near Lompoc, California; it covers several square miles, and ranges up to 700 feet thick. The bed contains many folds, but was apparently laid down horizontally at the bottom of a fresh-water Miocene sea. Kieselguhr consists of the siliceous skeletons of diatoms, of which over 2,000 varieties have been identified at Lompoc. According to the technical director of the company, three varieties predominate. The deposit is owned and worked by the Celite Products Co. H. S. Thacher of Los Angeles is general manager and E. B. Starr of Lompoc is plant manager. The company has a mill for treating a part of the product at Lompoc, which is about 4 miles from the quarries. At the present rate of production, the supply should last for several centuries.

The principal uses of the kieselguhr are: (1) sawed brick for refractory purposes; (2), compressed refractory brick, which in quality is between the sawed brick and ordinary fire brick; (3), ground product, used as filtering material at sugar mills; (4) light-weight filler in concrete, used instead of rock aggregate in some Government work; (5), insulation purposes; (6), automobile polish, silver polish, diluting talcum powder, etc., (7), nitroglycerin absorbent in some grades of dynamite.

The character of the material varies in different parts of the bed and only selected parts where the overburden is light, are quarried. Also, certain parts of the bed are used for specific purposes. After cleaning off the overburden, the diatomaceous earth is quarried by means of a channeling machine developed by the company. Cuts are made across the face 4 feet deep and 4 feet apart. The largest part of the production is used for insulating brick, which are sawed on the ground from the blocks cut by the channeling machines. The machine used for sawing the brick was also developed by the company. The material desired for grinding is quarried, after channeling, by pick and shovel and loaded by hand into horse-drawn wagons and then hauled to a drying

yard. The brick are hauled to a drying yard in light tram cars. After sun-drying, the brick are hauled to the railroad, and the other product to the mill in motor trucks.

At the mill, the sun-dried diatomaceous earth is fed by hand into an impact pulverizer, which is moved along the bottom of the storage bin. The pulverized material is drawn through galvanized iron tubing by an exhaust fan to the main building where it is packed for shipment in bags. The unbroken single diatoms are desired for filtering and some other uses. The dust, consisting of the finer particles and broken diatoms, which does not settle in the bins of the main building, is drawn into a bag house where it is filtered out of the air. This material is used for polishes and other similar purposes. All crushing is done dry.

The Kieselguhr is nearly pure silica and has the capacity of absorbing several times its weight of liquids. Dr. Herbert Insley, petrologist, U. S. Bureau of Mines, examined some of the samples under the microscope and made the following report:

"This material is very light in weight, due in part to its great porosity. Under the microscope, the material was found to be made up almost wholly of the skeletons of diatoms. These are composed of practically pure silica. The silica is evidently amorphous for there is no evidence of double refraction between crossed nicols. Most of the skeletons were unbroken. Complete skeletons more than three-tenths of a millimeter in greatest dimension were not observed, although some of the skeletons of which fragments were observed must have been at least seven-tenths of a millimeter in length. Disk-like diatoms containing hexagonal perforations or depressions and long, slender spine-like diatoms are very common."

Photomicrographs made by Dr. Insley show considerable fine dust and many sharp-edged particles.

The deposit is damp when first exposed, but during the summer months, the air is very dry and the wind blows almost continuously, hence the surface is soon dried.

## Idle Plants to Operate

### Rockcastle Company's Property at Pine Hill, Ky., to be Developed for Cement and Clay Products

After lying idle for about eight years, the property known as Pine Hill, at Pine Hill station, Rockcastle County, Kentucky, is about to be developed as a lime, cement and clay products proposition. To those who know this property it has been a matter of surprise that possessing as it does such obvious advantages and owned by such financially strong people, it should have been allowed to remain undeveloped as long as it has. It is a very large property of about 2,000 acres, and it contains practically inexhaustable deposits of limestone, shale, fire clay, and either actually on the property or geographically controlled by it are several million tons of fine semi-cannel coal. There is water on the place for extensive manufacturing operations and large tracts of timber.

It now transpires, however, that the owners of Pine Hill have not been neglecting or overlooking their property. Further investigations of all raw materials have been carried on both in the laboratory and by having produced in practical form from these raw materials lime, cement, hollow building tile, sewer pipe and face brick. These it appears have all been submitted to experts in the different lines, but more practical yet to architects, contractors, building materials men and users generally of their anticipated products. Exhaustive surveys have been made of the markets for their materials, and when they were satisfied that all the fundamentals of their proposition were sound and that the business recovery in the different lines in which they are interested warranted the large investment required work was commenced to put their plans in effect.

The first step was to recondition the lime plant, which was built on their property in 1912. This work was commenced on Jan. 1, 1922. All obsolete machinery was torn out and the plant was brought up to date in every particular. In anticipation of the heavy traffic it would have to carry, their short railroad from the L. & N. main line into their property was construct-

ed to carry the heaviest locomotives of that road. Ninety-five pound rails, close ties and the best of grading were used. Their lime plant has now been running for about six months, and is expected will be selling to capacity this spring. Plans are now being perfected to add five additional 16-ton kilns to the lime plant, which with the existing five kilns will balance the hydrating capacity. Plans too are being matured for a Portland cement plant with a capacity of one million barrels per annum, and also a clay products plant to manufacture hollow building tile, sewer pipe and face brick with the capacity of about 150 tons per day.

Richard K. Meade of Baltimore, Md., is the consulting engineer of the company, and is in general charge of the engineering and construction work.

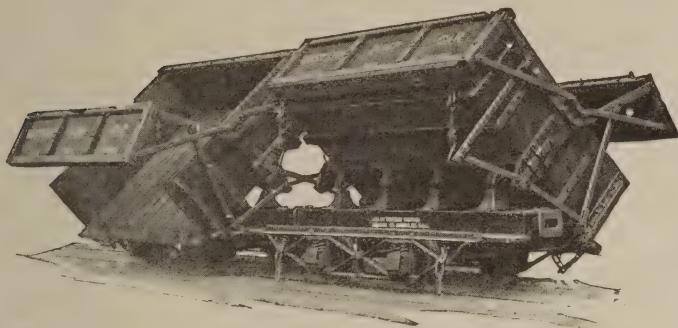
This company will inaugurate a new departure in sales development. Immediately construction work commences on the cement and clay products units, sales offices will be opened in Cincinnati, Louisville and Knoxville and with samples on display of its actual products in each office. An immense amount of work has already been done in the matter of getting freight rates established from Pine Hill to points in the broad field they expect to cover, so that with the opening of the sales offices intelligent business relations can be established with the buyers in all of their territory. Spot deliveries can of course be made on lime up to their present capacity, which it is anticipated will be much more than doubled in the current year. With these plans all in effect, the company believes that with its low cost of production, and favorable freight rates to Louisville, Cincinnati and Knoxville; by making gateways of these points, it will get its full share of the business done.

Cement will be the leader as it is the largest unit and negotiations are practically concluded with one of the most successful operating men in the country to take care of the cement plant. The same may be said of its sales manager, and other plant managers. No experiments will be tried by the company in either men, materials or equipment.

The Rockcastle Cement & Lime Company is practically owned by a strong group of bankers and capitalists in Baltimore, so the usual financial difficulties may not be anticipated.



# Maximum Production Low Cost of Maintenance



These are the two distinguishing qualities of Western Dump Cars. They **OUTWORK** and **OUTLAST** other dump cars.

Said a plant superintendent in Ohio:  
"We have worked those Western cars continuously for eight months without repairs, and they are as good as new today. That is a good record for any machine."

Your haulage system is the key to quantity production. It is not economy to handicap a good shovel and crushing plant by using antiquated dump cars. Western Dump Cars, compared with others, will pay for themselves.

Our catalog No. A-53 shows photographic views of many pit and quarry installations. Send for it.

**Western**

*That's  
Why*

## Western Wheeled Scraper Company

Earth and Stone Handling Machinery

AURORA, ILLINOIS

## Iowa Stone Producers Form Association

Stone producers of Iowa at a recent meeting organized the Iowa Stone Producers' Association.

Paul L. Nauman, vice-president of the Eagle Point Lime Works, was elected president; Stanley M. Hand, vice-president and R. N. Winkle, secretary-treasurer.

The association has two classes of membership, active and associate. The former is for quarry operators only, while the latter is open to material and supply companies that furnish material for use in quarries.

Headquarters of the organization is in Cedar Rapids.

## Bakstad Goes to Philadelphia Office

Mr. John Bakstad, who up to this time has been manager of the Chicago office of the Good Roads Machinery Company, has just left that office to take up more important duties at the company's home office at Kennett Square, Philadelphia, Pa.

Mr. M. A. King, who up to this time has been Mr. Bakstad's assistant at Chicago, will succeed him as manager of the Chicago office.

Both Mr. Bakstad and Mr. King are well known to crushed stone and gravel men of the Middle West. Their management of the Chicago office has been very successful and both are looking forward to further successes in their new positions.

## Evinrude Pump Improvement

The Evinrude Motor Company, Milwaukee, announces a recent improvement in the bearing equipment of its centrifugal pump.

To support the pump shaft at the lower end, a ball thrust bearing has been provided. This bearing supplants the lignum vitae plug heretofore used. After a six months' test it has been found that the ball bearing greatly increases the life of the lower bearings and also makes the pump operate more freely and effectively.

This improvement is of special value because it can be installed in those pumps now in the hands of users.

## New Capstan Car Puller

The Stephens-Adamson Manufacturing Company of Aurora, Ill., announces a new Monitor car puller of the vertical capstan type, self-contained and fully enclosed, which will pull from 3 to 5 loaded cars on a level track.

The new car puller is extreme in its simplicity and should prove popular with industrial concerns, who have cars to spot on side tracks. The power is furnished by a 7½ H. P. electric driving motor built into the device and entirely enclosed. The car puller requires little floor space and is only slightly over 4 feet in height.

The company asks that producers when writing for prices, state the number of loaded or empty cars to be handled, also that they give the characteristics of the electric current available.

Clifford F. Messinger, for the past three years general sales manager of the Chain Belt Company, Milwaukee, has been elected second vice president according to an announcement just made by the company.

The Bodega Materials Company, Murphysboro, Ill., has been recently incorporated with a capital of \$200,000. Incorporators: James C. Emery, R. E. Henfrom, Thomas Aldridge. Correspondent: F. O. Glenn, Springfield Ill.

Indiana interstate freight rates on agricultural limestone are expected to drop an average of about 25 per cent as soon as the railroad companies can publish the new tariffs. An immense amount of this agricultural limestone is transported in Indiana each year.

A rock and gravel crushing plant, to cost in the neighborhood of \$200,000, will soon be erected between Sacramento and Folsom, Cal., by the Pratt Rock & Gravel Co., recently organized by Clarence F. Pratt, president of the Pratt Building Material Company of San Francisco.

The Northwestern Sand and Gravel Company of Des Moines, Iowa, has purchased the stone quarry and rock crushing plant at the Cozzi quarry at East Quarry, Iowa, at a cost of \$100,000. The company intends to erect a huge reducing plant, and expect to have a crusher in operation by early summer.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

Vol. 7

CHICAGO, ILL., MAY, 1923

No. 8

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*Barber-Greene Bucket Loader owned by B. D. Hyde, New York, and Barber-Greene Conveyor owned by R. C. Products Trust, Cleveland*

## Delivery Now as Important as Cost

Common labor is getting scarcer and dearer so rapidly that keeping up with deliveries will soon be quite as important as keeping down costs has been.

Because of the increasing realization of this fact many who put off buying Barber-Greene material handling equipment while its principal advantage was a reduction of handling cost are now buying it in order to make sure of maintaining output.

With Barber-Greene conveyors and bucket loaders you can handle more material with fewer men.

The Moore Construction Company, of Nashville, Tennessee, reduced its overhead charge per yard by 66%, and in addition saved 25 men in loading gravel direct from bank to trucks.

The Oakland Building Material Company, of Oakland, California, uses a Barber-Greene Bucket Loader to make the most of the eight-hour day. With it they made a record of handling 105 five-yard truck loads on December 15. Significant, too, is the fact that the one Barber-Greene replaced two loaders of another design and type.

The R. C. Products Trust, of Cleveland, uses a Barber-Greene Conveyor to replace a locomotive crane in loading beach sand, because the Barber-Greene reaches 30 feet farther than a crane and saves men and money.

Send for our N catalog and our certified cost reports giving the experience of users.

**Barber-Greene Co., 490 W. Park Ave., Aurora, Ill.**

*Representatives in Thirty-three Cities*

**BARBER**  **GREENE**  
 Portable Belt Conveyors      Self Feeding Bucket Loaders



# Pit *and* Quarry

Vol. 7

Chicago, Ill., May, 1923

No. 8

## State Cement Plants

**M**OST of our state legislatures meet too often and stay in session too long. At least time seems to hang heavy for most of these legislators after the first few weeks; and then they seek to relieve the tedium and at the same time make a hit with the folks back home by introducing bills to build state cement plants.

South Dakota has been working on a proposition of this kind for a long time and has finally arrived at the point of taking bids just as this journal goes to press. These bids, however, were to cover only the office, stock house, concrete chimney and general foundations, as these are the only plans approved so far. These, if constructed and then abandoned because of lack of further approval and appropriation, would furnish a sorry monument to the state-owned idea. And such things do happen sometimes.

Governor Silzer of New Jersey has signed the bill authorizing the state highway commission to own and operate a cement plant. Regarding this the Engineering News-Record makes the following pertinent comment:

New Jersey has followed in the wake of several of her sister states to the west and has ordered the construction of a state cement plant. It remains to be seen whether she will follow the lead still further and neglect to build such a plant. Resentment against the high price and slow deliveries of cement is not confined to state highway departments, but it remains to be proved that these evils are the result of private ownership. The cement companies have put up a pretty fair argument in defense of prices, and one that can be answered

only by the construction and operation of a state-owned plant. As to deliveries, that is something beyond the control of the manufacturer. Only actual operation can determine whether a state-owned plant means cheaper cement to the state. There is not the danger of political control that lies in the state ownership of utilities, but there are still the possibilities of false accounting, the loss of taxes and the necessity of production over and above the needs of the state. If the state is to sell cement to its citizens, why not underwear or coughdrops? However, if New Jersey wants to try the experiment there are several other states that will be glad to have her try. It may prove pretty costly to the Jerseyites.

In Missouri the senate struck from the big contingent appropriation bill an item of two million dollars with a ten-million-dollar revolving fund with which the commission could buy or obtain through condemnation, cement plants, gravel beds and materials used in road construction.

The right of condemnation was placed in the road law of 1921 so that the state, if necessary, could acquire cement plants, should prices become too high.

The revolving fund, provided by the legislature two years ago, was put in the original house appropriation bill. It was stricken out in the senate appropriation committee, and the conference committee sustained the senate. The explanation given by senators opposing the appropriation was that the money was not used under the last appropriation, and that there might be an abuse of power by the highway commission. Some contended that if funds were needed to obtain cheaper road materials, the money

might be taken from the general appropriation.

In Missouri and other states this kind of legislation is more or less openly admitted to be a club with which to beat down the price of cement from the commercial plants. This is more than likely the main purpose of the Wisconsin bill providing \$30,000 for a legislative committee to investigate the feasibility of such a plant, and \$40,000 for obtaining an option on a site. A. R. Hirst, state highway commissioner, is reported to be strongly favoring the proposal.

Oklahoma voted down the idea, regarding which the Oklahoman says editorially:

The house acted wisely when it rejected the bill providing an appropriation of \$1,000,000 for the establishment of a cement plant to be owned and operated by the state. Such a plant would be a continuous burden for the taxpayers until abandoned, and then there would be a large loss on the investment. The privately operated cement plants are able to supply the needs of the state, while also furnishing cement for private consumption. There is no more reason why the state should make its own cement than the other highway supplies used by state institutions.

Ohio seems to be the last to come into this popular sport, and appears to want to authorize itself to produce almost any kind of road material. The bill as introduced authorizes the formation of a state road and building material commission, with authority to acquire by lease, condemnation or otherwise the property necessary. It is planned under the act, if passed by both houses and approved by the governor, to start a cement plant, or perhaps more than one, as well as sand and gravel plants in various parts of the state.

Of course in Illinois there is a recrudescence of this idea every little while, but it has lost its intimidating force, if it ever had any, and has also ceased to fool the taxpayers.

Minnesota seems fairly determined

to defy the "trusts" at whatever cost. Here is the way the Minneapolis News voices its willingness to add to the cost of cement in order to vindicate the honor of the commonwealth:

If Minnesota can make cement for anywhere near what it costs to buy it, the state ought to take steps immediately for the establishment of a cement plant.

There may be lots of reasons for such a course of procedure and there may be some reasons against it, but the biggest factor in the whole thing is the cry that is raised again and again that the cement trust is back of the Minnesota road program.

It has been shown repeatedly that money paid for cement is a small part of the cost of road construction in Minnesota even where paving is put in. It has been shown that some pavements are put in without the use of a single barrel of cement. It has been shown that by far the larger percentage of the roads are to be graveled roads and not paved roads. It has been shown that a great many of the roads will be merely dirt roads well cared for and policed.

But every now and then somebody pops up and attacks the road program because of the cement trust.

It would probably cost more for Minnesota to make her own cement than to buy it. There might be a saving in freight.

But whatever the arguments for or against, a cement plant in Minnesota would serve to check an insidious propaganda that menaces the progress of our road construction and puts us under suspicion.

## Cement Statistics

COMMENDATION is due all around for the way in which cement statistics were handled for 1922—to the Geological Survey, the Portland Cement Association, and to the individual manufacturers whose prompt returns made the compilations possible.

We are thus enabled month by month to have a fairly complete summary of the industry, with quarterly totals and comparisons. We also had a close preliminary report of last year early in January, and the report in April, much earlier than usual.



## "Do You Know Why?"

**A**N advertiser in PIT AND QUARRY uses the above caption to call attention to his advertisement. The whole question is as follows: "Do you know why costs are higher in one crusher plant than in another?"

This caption will certainly serve the advertiser's purpose in calling attention to his "ad," and no doubt many will read who would have otherwise passed it by; but this question really opens up a chain of thought for every operator of a sand or gravel pit and a stone quarry. Not only is this question applicable to a crusher plant, but to every detail of plant that may be opened and also as to methods of operation, likewise to business policies. Many other questions started the same way could be asked, as, "Do you know why one man sells all his products and cannot fill all demands, while another cannot find sale for all he produces?" Such questions are self-searching, and to find the reasons why, and to answer such questions, will prove helpful to any operator.

First one must have experience, not only to ask these questions, but to find the answers. As to plant, a man must know what equipment is best suited to certain requirements and more especially to his needs. If he does not have this experience, he must obtain it from others, and fortunately for him, there are a large number of manufacturers who are able to advise him and give him the information that he lacks. It must be remembered, though, that the advice of a manufacturer is based somewhat upon what he has to sell. Selling his own product is his prime incentive to the advice he will give. If a manufacturer has crushers to sell that do not exceed a thousand tons daily output, he can not well advise a man who wishes to produce twenty-five hundred tons daily. However it must be said in justice to manufacturers that the vast majority will

be honest to a customer and if unable to fill his requirements will be frank enough to so inform him.

But it is at this point that the business man will be wise to employ an expert who has no equipment to sell, to advise him. Such a man can only hope to be re-employed by advising his clients in the best manner possible.

To a great extent the same thing is true as to methods of operation. The operator should ask why and how others are getting better results than he is obtaining. This means that he must study how other people are carrying on their business. There is no better way of doing this than that suggested in the editorial on the opening page of PIT AND QUARRY in the April issue, where the editors of this journal advise operators to visit other plants and learn of new ideas and methods. It is by such visits that he will learn of improved machines and how to operate them, and especially will learn much regarding designs and lay-outs of plants. A man himself may have a well designed and the latest type of plant, yet may find another who is operating a similar plant to much better advantage. The "HOW" of any operation is better learned by seeing than by any other method. One of the greatest English writers of the age, Sir John Lubbock, aptly put it when he wrote, "I am a part of all I have seen."

As to why and how a man sells easier and conducts his business better, this can only be learned by studying what others have done and are doing. Today there are available a number of books on almost any business subject, besides a large number of trade and business magazines. Much can be learned by reading and studying these. It is not possible to make use of all one may read, but many new ideas and business methods can be assimilated and used that are gleaned from such publications,

## More Carrying Capacity

IT IS a pleasure to note that the railroads are taking a view of greater responsibility in the matter of meeting the transportation needs of the country. This is evidenced in the recent special meetings in New York of the American Railway Association and the American Railway Executives, and in the results thereof.

These organizations have reviewed the situation in a careful manner; and with an estimate before them of the year's business, based on conservative data, showing unprecedented demands upon their resourcefulness of operation, they adopted the following as a definite policy and working program:

1. That by October 1, 1923, when the peak movement ordinarily begins, cars awaiting repairs be reduced to the normal basis of five per cent of the total equipment of the country.

2. That by October 1, 1923, locomotives awaiting heavy repairs be reduced to the normal basis for the entire country of fifteen per cent.

3. That to the extent coal is stored for railroad use, complete the storage requirements by September 1st, so that after that date the equipment and other transportation facilities may be used to the greatest extent for commercial coal necessities.

4. That the use of power and equipment for railroad construction and maintenance purposes be restricted to the minimum after September 1st in order that a maximum of power and equipment may be available for commercial purposes.

5. That railroads in producing and consuming sections impress upon all interested the necessity for movement of coal and ore via the Lakes in the largest possible quantity early in the season. That railroads serving upper Lake ports carry on campaign for early purchase and shipment of coal from the upper lake docks to points of consumption.

6. That an effort be also made to bring about the prosecution of road and building construction work as early in the season as possible in order that equipment may be available for larger movement of seasonal commodities.

7. That all interested be impressed with the necessity for loading all cars to maximum capacity in an effort to bring the average loading to thirty tons per car for the entire country; for unloading cars promptly; increasing storage facilities where necessary and practicable and providing adequate siding capacity to facilitate loading and unloading, thereby increasing the number of available cars.

8. That every possible means be adopted to increase the mileage per car per day to an average of thirty for the entire country, particular attention being given to prompt movement through terminals and yards and to the issuance of embargoes when necessary to prevent congestion.

Cooperation of shippers and the public in the past has been most helpful in bringing about heavier loading, prompt unloading and increased mileage per car, and only by their continued co-operation and their full knowledge of what this means to their own transportation requirements can results be secured in these matters. It will be understood that each individual railroad will co-operate with its own shippers to this end and the car service division will take similar action with national and district associations to bring about the fullest measure of co-operative effort.

9. In the event of a car shortage, reports to the Car Service Division should be carefully reviewed by each railroad organization so that the report will more nearly indicate the actual car shortage measured by the ability to load daily, rather than a cumulative shortage which does not reflect the daily existing condition.

10. The railroads have already established and have in active and effective operation a comprehensive organization in the Car Service Division for the central control and distribu-



Here's good news for you!



tion of freight cars which, during recent periods of car shortage, has under difficult conditions, secured to the public the best possible use of available freight equipment. The Car Service Division as a central agency, and through their District Managers, together with the District Shippers Committees, which have been and are being organized, will keep informed of traffic requirements with a view to the equitable and timely distribution and handling of equipment.

The railroads pledge themselves to renewed and effective compliance and co-operation with the directions of the Car Service Division, asserting the belief that, with the new equipment on order and the program for rapid conditioning of equipment requiring repairs, the freight equipment of the railroad will be handled and used in moving the commerce of the country to the best possible advantage.

The co-operation of the public with the railroads and their officers and employes generally is invited in order that by a better understanding and united effort transportation may be facilitated and the needs of the country more promptly and adequately provided for.

It was also resolved that individual roads give to the general public and to the patrons of their respective lines, information as to their program and also keep them currently advised of the progress made hereunder, including, so far as the individual line is concerned, information as to the progress made in its locomotive and car repairs and other improvements in transportation facilities.

Encouraging was the report pre-

sented showing that individual railroads in the fourteen months from January 1st, 1922, to March 15th, 1923, have purchased an aggregate of 223,616 new freight cars, of which 117,280 have been delivered and put in service, and on March 15th, 106,336 were on contract for delivery during 1923; and in the same period, have also placed in service or purchased an aggregate of 4,219 new locomotives, of which 2,106 have been placed in service, and on March 15th, 2,113 were on contract for delivery during 1923.

The numbers given, both as to new cars and new locomotives, are exclusive of subsequent orders which it is anticipated will be placed during the current year.

"The significance and importance of these figures will be appreciated," says the report, "when it is remembered that the average number of new cars and new locomotives added over a period of ten years, 1913 to 1922 inclusive, has been 101,009 new cars per year and 1,960 new locomotives per year, and that during the two years and two months of Federal control there were purchased a total of 100,000 new cars or approximately 46,000 per year, and 1,930 new locomotives, or approximately 890 per year."

## Tests Weathering of Limestone

A series of tests to determine the resistance of limestone to frost action is now under way at the Bureau of Standards.

Small samples cut from the stone are soaked in water and are then frozen. After freezing they are put back in the water to thaw.

Of the samples tested many showed serious disintegration after they had been frozen seventy-five times. Others have now been frozen as many as eight hundred times and show as yet no serious disintegration. The samples come from different localities; and when the tests are completed the data will be of value to architects in the selection of building stone,



The railroads are getting busy!

# Rules for Blasting

By DANIEL J. HAUER

**T**HERE have appeared in recent issues of PIT AND QUARRY several articles under the above caption or bearing on this subject that anyone interested might read before beginning this article, for nothing like the notes herein given have ever appeared in print, and as they have been useful to others they may prove the same to the quarry readers of this journal.

One of these articles appeared on page 61-67 in the August, 1922 issue. In this article there was one mistake made on page 64. The cut numbered Fig. 3, should have been Fig. 4, while the one numbered Fig. 4, should have been Fig. 3.

The second article appeared in the September issue on page 88-90, being entitled "Some Notes on Blasting." In the November issue on page 76 and 77 there was an article on big blast hole drilling, while another article bearing on the subject of blasting appeared in the September issue entitled "Methods of Breaking Boulders."

This last article covers some details of secondary blasting, while the article in the November issue discussed some features of primary blasting.

The other article appearing in the September issue discussed these two subjects, primary and secondary blasting, at some length, and although appearing after the article in the August issue, yet leads up to the general article on "Rules for Blasting."

This last named article is the basis for this article and some future ones on this subject. In it was shown the need for a rule or formula. The effective force of explosives was illustrated and the need of springing holes when certain types of drills are used, and a rule was laid down for deciding upon the charges for making springs.

Weights of stone were given and a

factor for converting cubic yards into tons or vice versa. A discussion of how much rock various kinds of powder should loosen was likewise given, and it was stated that the writer used a dense sandstone as a standard or basis for all blasting.

With this as a basis and using the table given on page 89 of the September issue and likewise those on page 64 of the August issue, it is possible to obtain a factor converting the yardage moved by a blast from the standard of sandstone to any other kind of rock given in the list. The entire basis is cubic yards of dense or hard sandstone being loosened by one pound of 40 per cent strength dynamite. This is an average rather than a minimum or a maximum amount.

A word as to the minimum of rock loosened by a blast. If shallow holes are shot it is not always possible to loosen this amount, especially if the holes are less than 10 feet, but if the holes are 20 to 30 feet then the minimum should be obtained. With the modern deep hole drillers 30 foot holes can be classed as shallow drilling. With holes from 30 to 50 feet the average yardage should be obtained, while with holes of greater depth, the maximum yardage should be loosened. These facts cover open cut, side hill and quarry blasting.

The factors are as follows:

|                                |      |
|--------------------------------|------|
| Soft or friable sandstone..... | 1.16 |
| Dense or hard sandstone.....   | 1.00 |
| Dolomites .....                | 1.16 |
| Limestones (soft) .....        | 1.16 |
| Limestones (hard) .....        | 1.00 |
| Serpentine rocks .....         | 1.00 |
| Schists .....                  | 1.08 |
| Gneiss .....                   | 1.00 |
| Trap rock ...                  | 0.90 |
| Granite .....                  | 0.84 |

To obtain these results the holes must be spaced properly and the proper charge given.



FIG 1



The spacing of holes must be considered from two standpoints. First the distance the hole is placed back from the breast of the ledge. The face of the ledge must be approximately perpendicular. If it is not then

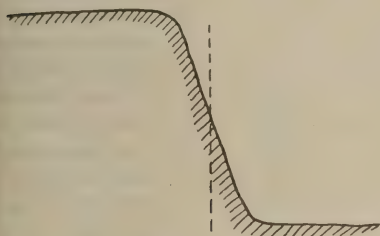


FIG. 2

it should be made so whenever possible.

Figs. 1, 2 and 3 show three cross sections of breasts of rock. In Fig. 1, the top of the breast can be used for measuring, but in Fig. 2, the midway point as shown by dotted line should be used. In Fig. 3, a breast is shown that should not be shot until the toe is worked out as indicated by the dotted line. To shoot it in the condition shown means inefficient blasting and the likelihood that part of the breast will remain in place as indicated by the line drawn across the toe. After the toe is worked out then measurement may be made from the top or middle as explained for the other illustrations.

The next thing in spacing is the distance between the holes. Consequently if blasting is to be done along scientific and the most efficient lines, the first formula or rule must be for spacing holes. This spacing must be either for large bore holes, that admit of the charge being placed in the bottom, or else well sprung holes, for it is obvious that the explosive will do less work if it is distributed throughout the bore of a long hole than when it is confined to a small area as it would be in a well sprung hole, where the explosives are placed

directly under the bed of rock. This is due to the fact that as previously explained an explosion is a series of wave motions and thus acts in a concentric manner. Likewise when a blast is detonated or ignited there is a series of instantaneous explosions, and these take place quicker and one helps the other much more effectively when in a solid mass as in a large bore or sprung hole.

This is shown in Figs. 4 and 5 where a large bore hole has been sprung and the charge is confined to a few feet in the bottom of the hole and the detonator is placed approximately at the center of the mass of powder, while in Fig. 5, the same charge is shown in an unsprung large bore drill hole, taking up twice the length of the hole and the detonator likely to be placed away from the center of the charge.

It is easy to see that if a comparatively small charge is to be used to make a heavy blast then even this size bore of hole should be sprung in the interest of economy and efficiency.

The sketches given in Figs. 6 and 7 show the general method of laying out holes and loading them for quarrying rock for crushing purposes, for small building stone and one and two man stone for rip rap and similar

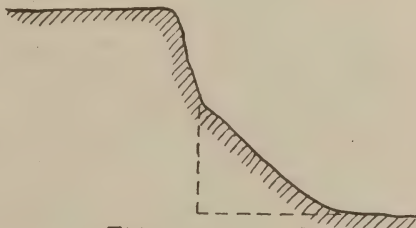


FIG. 3.

wet or dry masonry. Also for a combination of these products and large rough building stone and rip rap being quarried in connection with a crushed stone proposition.

In Fig. 6 is shown the top view of

a quarry stone ledge, and Fig. 7 is the cross section of the ledge. For economical use of explosives two or more holes should be shot at one time, so that there should be a series of holes and charges exploded. This fact should be self evident as with two or more disruptive forces being simultaneously concentrated on the same mass each working in a concentric manner, a

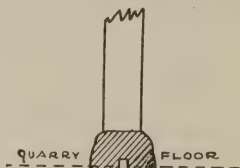


FIG. 4

greater portion of the mass should be torn asunder and it should be broken up finer. Thus the basis of the rule to be given takes into consideration these factors, and also that of stemming. Too many quarrymen in using dynamite do not stem their holes, as they did previously when black powder was in common use. This is due to several erroneous impressions, one being that dynamite shoots down, therefore the hole can remain open; and a second that if dynamite exerts the same pressure in all directions, leaving out the stemming material is of no importance. Both of these conclusions are wrong even if partially based upon facts, for as previously stated any explosive does most of its work in blasting in the direction of least resistance, and with an unstemmed drill hole much of the force of the powder can go out of the hole just as it does through the barrel of a gun. With the large diameter drill hole now in such common use, more of the force of the blast is lost than in former years when hand drilling and tripod drills were in common use. Thus all holes should be stemmed.

The number of holes to

be blasted at one time must be decided from the size or extent of the operation and the method of handling the blasted rock.

It is obvious that if only a few hundred cubic yards of stone are produced a day, a blast of a few thousand cubic yards of rock is as large for this quarry as is one of 20,000 cubic yards for a quarry that is putting out

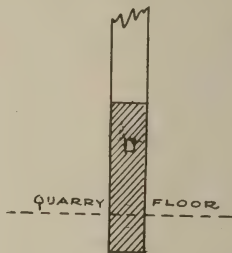


FIG. 5.

1,500 cubic yards in a day.

Generally speaking the larger the blast the more efficient it should be, yet it is not the part of good business to throw down such a large quantity of rock that the interest on the cost of drilling and blasting would be a serious overhead charge. For instance the writer remembers one case where it was stated that enough rock was thrown down in a quarry to give it blasted material to last two and a half years. If the drilling and blasting in this case cost \$20,000, then the interest lost on this amount at 6 per cent per annum equalled 15 per cent or almost \$3,000 which would be excessive as compared to an \$8,000 blast, which would have covered a year's operation and given an interest charge of \$480.

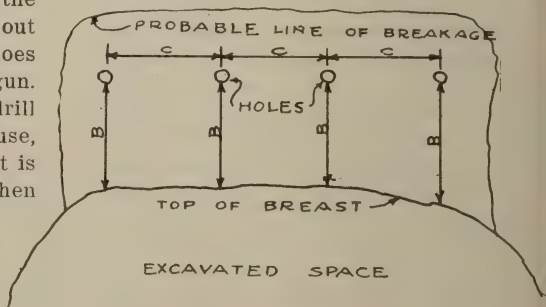


FIG. 6



The spacing of holes here given is for sandstone and can be illustrated by the sketch in Fig. 6. The height of the breast is denoted by  $A$ . The distance from the breast to the proposed hole is  $B$  while the space between the holes is  $C$ .

The height of the breast being known the rest can be found by the following rule, which is based upon dense sandstone.

*Rule 2. The distance  $B$  should equal two-thirds of  $A$ , while  $C$  should be 75 per cent of  $B$  or approximately one-half of  $A$ . Thus  $B = \frac{2}{3}A$ , and  $C = \frac{3}{4}B$  or  $\frac{1}{2}A$ .*

This gives a rule for spacing all holes in any kind of rock; for by referring to the table of factors for different kinds of rock and multiplying the results obtained by this rule, the spacing for the specific rock being worked can be obtained.

Thus if a breast is 66 feet high then  $B$  will be 44 feet and  $C$  33 feet in dense sandstone. For soft sandstone  $B$  would be 51 feet and  $C$  about 38 feet, while for hard granite the factor 0.84 would be used making  $B$  37 feet and  $C$  27 feet.

The next rule is based upon this one and is to obtain the amount of powder needed. It can be seen that if the breast is 66 feet high, the holes spaced back 44 feet from the breast and that ten holes are to be used spaced 33 feet apart that there is a block of stone  $66 \times 44 \times 330$  feet to be moved in front of the row of holes. Although with ten holes there are only nine spaces, yet it is known that in each end the rock should be broken beyond the holes about half the distance  $C$ .

Therefore the cubic yards to be moved would be  $66 \times 44 \times 330 = 958,320$  cubic feet = 35,493 cubic yards.

The next step is to refer to the table on page 89 of the September issue of PIT AND QUARRY and by dividing the average of the yardage moved

by one pound of 40 per cent dynamite into the total number of cubic yards, you have the amount of explosive to use for the blast. For sandstone this average is three cubic yards so that it would take 3 into 35,493 equals 11,831 pounds of explosives and with ten holes an average for each hole of 1,183 pounds.

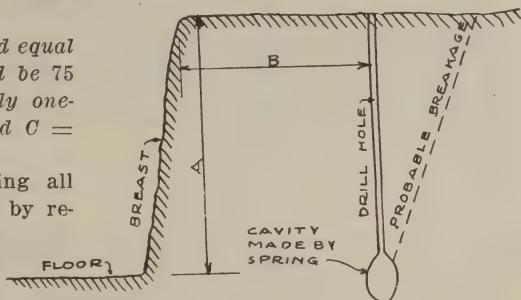


FIG. 7.

With a probable breakage beyond the holes of a fifth to a fourth of the yardage in front of the holes, this varying with the depth of the holes, this charge would give you a breakage of from 3 to  $3\frac{1}{2}$  cubic yards to the pound of explosive.

In another article we will see how these same rules work out with other kinds of rock, and consider other features that make these rules workable.

## Explosives Sold

The quantity of explosives sold in the United States during the calendar year 1922 was greater by more than 16 per cent than the amount sold in 1921, according to the Department of the Interior. Reports received by the Bureau of Mines show that the total sales amounted to 431,772,077 pounds as compared with 372,107,503 pounds the year before. Of the total amount sold 178,866,225 pounds was black blasting powder, 209,476,084 pounds high explosives other than permissible explosives, and 43,429,768 pounds permissible explosives.

George Olds, of Rochester, Ind., is planning to open a large gravel pit in that section.

# Tidewater Sand and Gravel Operation

The Old Dominion Sand and Gravel Company of Richmond, Va., operates at Petersburg, Va., a plant which employs some unusual operating methods, and has a number of features which should be of interest to all sand and gravel producers.

The Old Dominion Sand and Gravel Company is one of the interests of the Warner Moore Company, well known lime producers. The plant is in charge of Mr. Herbert Wingfield, general manager, and Mr. Rogers, superintendent. Under the direction of these two gentlemen the plant is operating successfully and profitably, turning out seven products which include a building sand, a  $\frac{1}{4}$  inch concrete sand, a roofing gravel, a  $\frac{3}{4}$  inch gravel, a  $1\frac{1}{2}$  inch gravel, a  $2\frac{1}{2}$  inch gravel, and a road gravel of plus  $\frac{1}{4}$  inch minus  $2\frac{1}{2}$  inch size.

The deposit, located as it is in Tidewater Virginia, is not always so far as working conditions are concerned, a fixed quantity. The water in the deposit is influenced by the action of the tides, and the rise and fall of the stream along which it is located. Along with certain advantages this condition includes certain other disadvantages.

The material secured from the deposit is strong and hard, containing high proportions of flint and quartz—in fact, the deposit is well known for the amounts of material of silicious origin that it contains.

The overburden on the deposit is light, but must be carefully removed, for it contains a great deal of the trashy material often found in swampy ground. Under this overburden marketable material runs down to a very considerable depth, and assures the plant of a large supply of good sand and gravel.

Materials are excavated by a Bucyrus dragline, equipped with a Page scraper bucket and mounted on a platform which is moved from place to place by wooden rollers, as shown in one of the accompanying photographs. This machine is steam driven.

Sand and gravel excavated by the dragline is loaded direct into railroad cars of 80,000 pounds capacity, and hauled to the plant. These cars were made at the plant, under the supervision of Mr. Wingfield, by mounting special bodies on standard railroad trucks. At first, trucks of 60,000 pounds

capacity were used, but it was later found advisable to increase to the size now in use. The plan of using these large cars appears to be eminently successful. With the haulage equipment that the company has these large dump cars seems to fit very smoothly into the task of conveying materials from the dragline to the plant. Their large capacity keeps the dragline working more steadily and imposes less work on the locomotive, and keeps a steadier supply of material running into the plant.

The cars are dumped very simply by the operating of levers at the side, which drop the bottoms and allow the sand and gravel to fall to a grizzly between the rails. Underneath this grizzly is a car hopper, a storage space of capacity sufficient to keep the plant going for a time, should the dump cars run a little bit off regular schedule.

A chute at the bottom of this hopper leads to a chain bucket elevator, 40 feet between centers, discharging at a scalping screen which serves the purpose of separating material intended for crushing from that which goes directly ahead to the plant. Sand and gravel passed by this scalping screen and intended for the regular course through the plant go first into what is known as the main hopper, an ample storage compartment, which serves to make for a flexible and steady operation.

Material that is rejected by the scalping screens drops to a No. 5 Champion crusher, and from this machine to the end of a chute from the main hopper that feeds an elevator leading to the screening plant proper. A No.  $8\frac{1}{2}$  Acme Crusher, used for secondary crushing, spouts into the end of the chute of the main hopper.

It will be seen from this description and from the accompanying sketch that this plant is divided more pronouncedly in two departments than most plants. The only connection between the crushing department and the washing and screening departments is the elevator carrying from the former and the chute carrying back rejections for recrushing.

The crushing department, the first unit, is built very compactly. A large amount of space in this structure is taken up by the main hopper which



feeds the elevator to the screening and washing plant. Directly over the hopper is a rotary scalping screen, the higher end of which leads through a short chute to the head of the first elevator. Bins are located below the low end of the scalper to which loading chutes are secured.

The washing and screening plant is fed by a chain bucket elevator, 80 feet between centers, running from a point below the chute out of the main hopper, up to the sizing screen at the top of the washing and screening department. In connection with the installation of this elevator there are two interesting features, neither of which may strike many producers as particularly new, but both of which would appeal to all producers as sensible provisions and, in the case of one of these features, as a practical guarantee against serious damage to the elevator.

The first of these features, shown in one of the accompanying photographs, is that of attaching flanges to the sides of the buckets used in the elevator and by these flanges mounting the buckets on the links of the chain. This method of mounting buckets has been the means of considerably reducing the wear on the bearings, the rail and the buckets. The reasons why the removal of the links to a distance from the bucket will result in cutting down wear should be apparent to any producer



Showing the Character of This Tidewater Gravel Deposit



Note Way in Which Buckets are Offset From Links of Chain



Bucyrus Dragline Used for Excavation of Material

who is operating a chain bucket elevator for carrying such abrasive materials as sand and gravel and crushed stone.

The second feature of the elevator is seen in the driving pulley at the top. This driving pulley is powered by a rope drive from the main counter-shaft at about ground level, connecting with the power house located to one side of the crushing plant. Power is transmitted from the rope driven pulley to the head of the elevator by a chain which, while well capable of standing the strains to which is would ordinarily be subjected, is still weaker than any part of the elevator itself and would naturally be the first thing to break in case the elevator should "hang." A number of costly breakdowns at the Old Dominion plant has taught this lesson. On one occasion, when the elevator "hung," a high-priced and difficultly installed sprocket was broken before the power could be shut off. Now, should an accident happen, there need be no worrying about this sprocket. The chain before mentioned is certain to give out first, saving the sprocket and the rest of the elevator from serious damage. The idea will not be new to many producers, but it will be to some others, and should be acceptable to all.

This large elevator running from the crushing to the screening and washing plants, discharges at the rotary screen equipped with a sand jacket and means of conveying the sand to a Dull sand tank. One product of this screen is  $\frac{3}{4}$  inch gravel, which is dropped by a chute directly to loading bins. Rejections from this screen are dropped by chute to a reject screen that is equipped interchangeably with  $1\frac{1}{2}$  and  $2\frac{1}{2}$  inch perforations. The product of this screen also goes direct to bins and its rejections through the reject chute to the No.  $8\frac{1}{2}$  Acme crusher which serves as a recrushing machine and spouts the material as described, into the end of the spout of the main hopper leading to the main elevator.

The matter of careful sand washing is given pretty close attention at this plant and, as a result of the effort expended, a good supply of clean material is available. Over and above the sand for which there is a steady demand, quite an amount goes into a stock pile shown in one of the photo-

graphs at the back of the plant. The proportion of sand to gravel at this plant runs pretty high and thus large stock piles of sand soon accumulate.

Material is all loaded on cars from overhead through bottom bin gates. On one of the loading tracks there is at the side a chute for running into cars a mixture of  $\frac{3}{4}$  inch and  $2\frac{1}{2}$  inch gravel, a popular seller. As shown in the photographs and sketch there are two loading tracks, and a loaded car track at the lower level running between the crushing plant and the screening and washing plant. Cars are dropped in the proper positions on the loading track by gravity and are then sent up the tail track to a switch back through which they are passed to the loaded car track, all by gravity.

Power is furnished to the plant through rope drives running from the main counter shaft referred to above, which leads out of the engine room from the power house at the side of the crushing plant.

Construction at the Old Dominion Sand and Gravel Company's plant was done along solid, substantial lines. The washing and screening plant is supported by concrete pillars which, aside from compactness, impart great strength. It was necessary in the construction of this washing and screening plant, as well as of the crushing plant, to erect good foundations. This has been done in all cases and the structures are very substantial.

Adjoining the power house is a well-equipped machine shop in which much of the repair work of the plant is done and certain iron shapes, etc., which can be made more cheaply than purchased, are turned out.

Under the guidance of Mr. Wingfield and Mr. Rogers the plant is operating very successfully and profitably. Mr. Rogers is a man of more than average mechanical ability whose experience falls in well with that of Mr. Wingfield, a trained engineer.

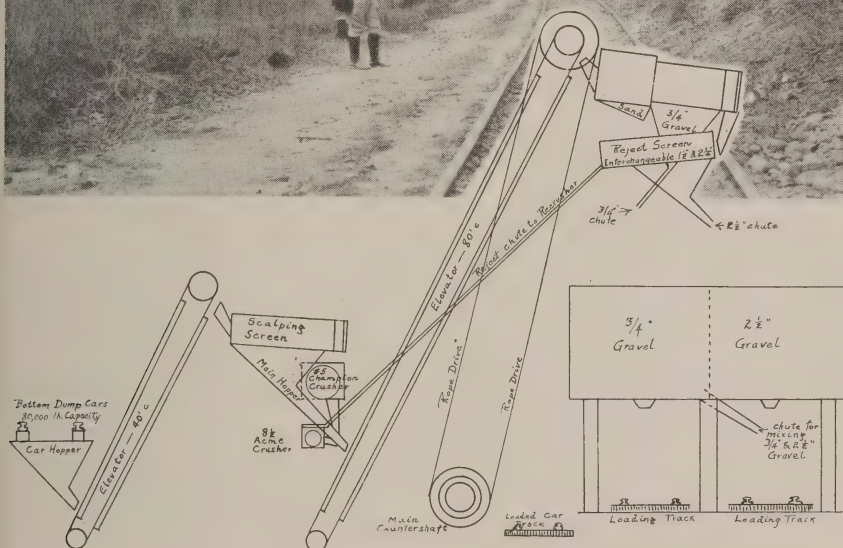
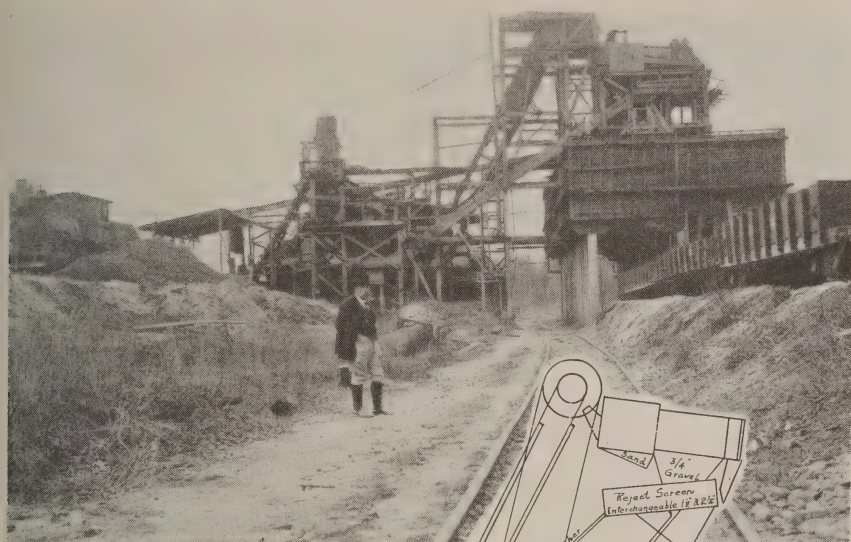
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The Pleasant Lake Gravel Co., Lima, Ohio, has recently been incorporated with a capital of \$60,000. The incorporators are Cliff M. Wood, Fred L. Hammer, Dan R. Tripplehorn, Nella L. Wood and Homer N. Wood.

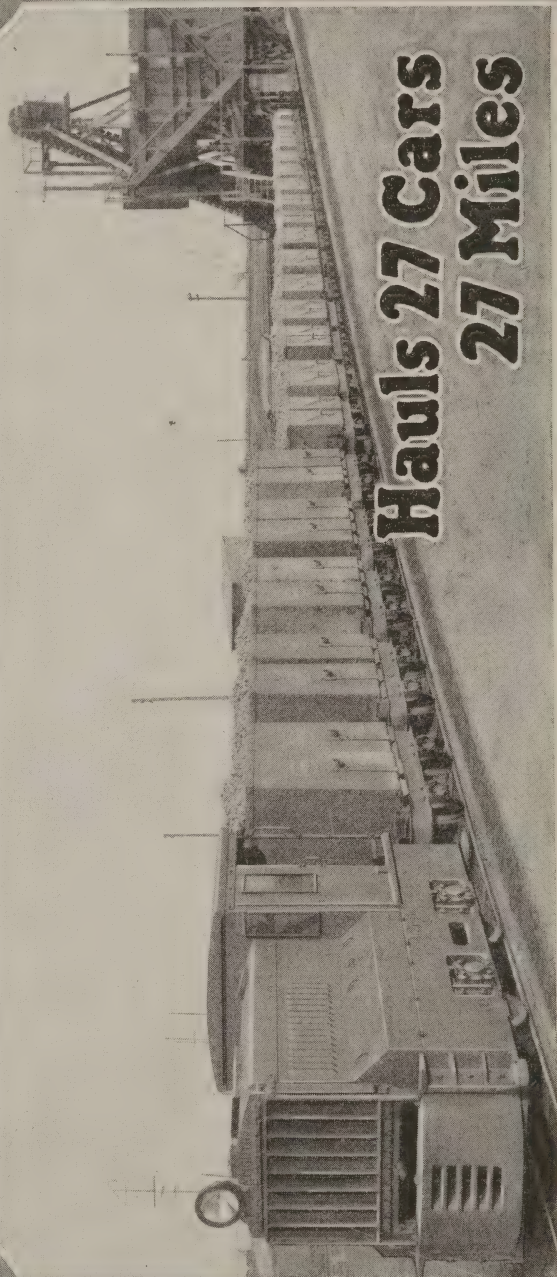
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The Turner Sand & Gravel Co., San Antonio, Texas, has increased its capital stock from \$50,000 to \$150,000.





Sketch and Views of Plant of Old Dominion Sand and Gravel Co.



## Hauls 27 Cars 27 Miles

The Kaiser Paving Co., of Oakland, California has the contract for 18 miles of concrete paving connecting the Valley Boulevard with the Coast Line, at a cost of \$530,000.

Material for this job will be hauled 27 miles, a round trip of 54 miles—and the hauling is being

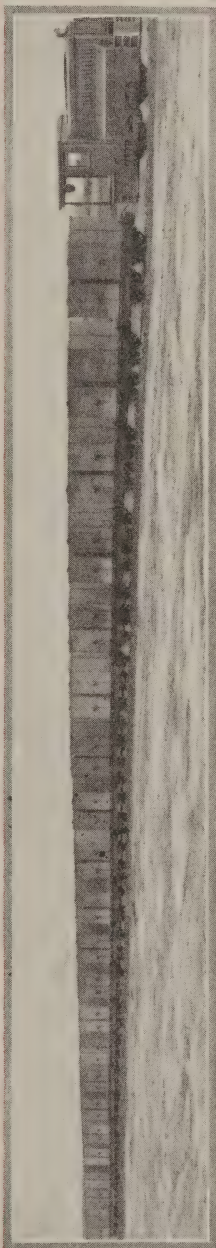
The Kaiser Paving Co.'s  
Statement



8 miles or 12 per cent, but the PLYMOUTH  
takes them up this grade seemingly without effort.

*Ask us for Bulletin fully illustrating and  
describing this superpowered Locomotive.*

**The Fate-Root-Heath Company, Plymouth, Ohio**



**PLYMOUTH**  
*Gasoline Locomotives*

everything and more than was  
expected of them.



Before, during and after a blast at New Ulm, Minn.



## Blasting at New Ulm

### Stone for Spring Work Shot Down in One Big Blast

On the opposite page are shown three illustrations taken a short time ago at the quarry of the New Ulm Stone Company, New Ulm, Minn.

The top picture shows the quarry just before a blast was touched off. The face is 60 feet high and 1,000 feet long. On the top is the Armstrong No. 25 special drill with which the holes were drilled, these being spaced 20 feet apart and loaded with 60 per cent Hercules dynamite.

The second illustration shows the initial stage of the blast, the whole face of the quarry seeming to rise upward and outward.

Below is a photograph of the quarry after the blast, with the stone ready to be placed in cars by the steam shovel and hauled to the crusher with a Plymouth locomotive.

About 25,000 tons of material was torn out by this blast, using 3,550 pounds of dynamite.

The material is quartzite, and reported by the Bureau of Public Roads to be the hardest tested up to the date of the test.

## International Cement Returns

The International Cement Corporation reports net income of \$1,420,371 for the twelve months ended December 31, 1922, equivalent after preferred dividends, to \$4.04 a share on the common stock, as compared with \$1,457,880, or \$4.30 a share in 1921.

For the quarter ended December 31, 1922, net income amounted to \$457,079 after charges and Federal taxes, equivalent after preferred dividends to \$1.33 a share earned on 324,722 shares of no par value common against \$432,929 or \$1.25 a share in the preceding quarter and net income of \$189,263 in the fourth quarter of 1921.

Total sales in fourth quarter of 1922 were \$2,960,768 against \$2,482,752 in 1921, and expenses, depreciation, etc., amounted to \$2,460,026 against \$2,191,572.

## Evansville Is Active

### Producers Along the River are Preparing for Busy Season

By Our Evansville, Ind., Correspondent

Sand and gravel fleets along the Ohio river, the Wabash river and White river are starting what they believe will be the busiest season in many years. Many of the plants have been enlarged to get ready for the season's business. By the first of May it is expected that operations will be in full swing at the plants at Evansville, Tell City, Rockport, Mt. Vernon, Grayville, Ill., Hazelton, Ind., and Shawneetown, Ill. There has been a great deal of building planned for the season and there also will be a large program of road building in southern Indiana, southern Illinois and western and northern Kentucky carried out during the summer and fall. The plants at Evansville are busy now and the owners expect to have about all the work they can handle for several months to come.

The building of the new bridge over White river at Hazelton, Ind., thirty miles north of Evansville, is taking a lot of sand and gravel and fleets along the White river plying between Hazelton and Petersburg are busy.

The Penglase Engineering Company at Grayville, Ill., organized about two years ago to handle sand and gravel along the Wabash river, is busy. Several fleets have taken out sand and gravel this spring for road construction work in both Indiana and Illinois. The company is owned by capitalists at Grayville and Evansville, S. B. Alnutt, a banker of this city, being one of the stockholders. The company's fleets have been operating recently on the Wabash river at both New Harmony and Crawleyville.

The Eastwood Sand and Gravel Company at Grayville, Ill., is erecting a new plant and the outlook for trade for the season for this company is good. The two new boats built by this company have been launched on the Wabash river and the two barges will be ready for launching about the middle of April, it is announced. The four boats have been built by a construction company at Ripley, Ohio.

# The Art of Shoveling

By DANIEL J. HAUER

IN THE December issue of PIT and Quarry there appeared a short article on the use of shovels. This was meant as an introduction to a series of articles on the use of shovels and the art of shoveling. In this first article was pointed out the need of training men to shovel and that there are correct and incorrect motions to use, and that even if the men are properly trained they cannot do the most economical work unless they have the proper tools.

"A spade is a spade," is an old saying, yet as the modern shovel is the successor of the old time spade, there are many different kinds of spades and shovels. So today it is necessary to select shovels for the various kinds of work that must be done.

Shovels vary much as to sizes of blade and shapes, but all shovels today can best be divided into two general classes based entirely on the length of the handle.

The shovel in most common use in this country is the short handle shovel, generally called the D handle shovel, due to the fact that the hand grip on the handle is shaped like the capital letter D. The one in most common use in continental Europe is the straight long handle shovel. This kind of shovel is frequently referred to in America as the "lazy man's tool." This is based upon an erroneous assumption, for if a close study is made of the subject it will be found that a lazy man can kill more time with a short handle shovel than with a long, or to put it another way, the indifferent workman will do more work with a long handle shovel in spite of himself than he will perform with the D handle tool. This is due to the fact that the man performs less motions and does more work with less expenditure of energy.

Anyone can experiment with the two kinds of shovel and if careful and exact records are kept it will be found that the statements made here are correct. This will be shown in greater detail later in the article.

The only other variation in the handle is that known as the lift, a matter to which little attention is paid, except by the manufacturers, yet at times the lift is of importance, especially for very tall or very short men.

The rest of the differences in shovels are in the blade, not only in the size and shape. Sizes are made standard varying somewhat with the manufacturers, although the general sizes are nearly the same, yet they may be designated differently by the various manufacturers.

But the shape has much to do with the ease of shoveling and the quickness of picking up the load of material.

For earth mixed in the rock, or for rock broken into irregular size, as in a quarry, and also for heavy clays, a round pointed shovel with a decided curl or roll to the blade should be used. The pointed blade seems to be able to cut under the rock more easily, and the curl holds the load better except where the rocks are large, 6 inches or more in dimension. When there is much of this size of stone and little or no earth or fine stuff, a stone fork should be used.

Flat stone forks, with two outside tines raised above the rest, are better for handling stone, except to clean up a pile, than shovels. A three quarter length handle admits of easy handling, and the tines go into the pile or under it more easily than does the solid blade of a shovel.

For concrete and for crushed stone



shoveling a square pointed shovel with the edges of the shovel turned up, should be used for small sizes of crushed stone or run of the crusher, or for fine gravel, chert and similar materials. For the large sizes of stone, a flat, round pointed shovel with the sides slightly turned up should be used.

For sand, especially if moist, a flat wide shovel with the edges turned should be used. It is frequently possible to moisten sand for shoveling if it is not always wet. When this cannot be done and the sand is entirely free from loam and runs easily, then a small size scoop shovel should be used. However, as the scoop is likely to weigh more than the flat square pointed shovel, the latter should be used if it will carry an economical load.

Coal should be shoveled with a scoop; but as there are different grades of coal, such as buckwheat, rice, pea, lump coal, nut coal and run of mine, it is necessary to get different sized scoops in order to handle an economical load. The sizes of scoops will vary slightly in shape. It is, however, seldom that more than one or two different kinds of coal are used at the same time, so that it is not an expensive proposition to have the proper shovels. When the coal is being shoveled from a car or a bin, from on top, a breaking down scoop should be used in one corner until the bottom is reached, when the regular scoop shovel should be brought into play. A breaking down scoop has a long sharp point and is made round and not so flat as the ordinary scoop.

Very fine gravel should be handled with a scoop, but coarse large gravel should be handled with the same shaped shovel as it used for crushed stone.

Thus there are three factors in selecting a shovel: First is the length of the handle, second, the shape of

the blade, and third, the size of the blade.

More than twenty-five years ago the writer made some experiments to determine the load that a shovel should carry, but he could not afford to have special shovels and blades made to test out all the deductions he was able to make from his experiments. These studies have continued through the years. The only other man the writer knows of who has conducted any extensive experiments and tests of shoveling was the late Frederick W. Taylor. From the writer's own tests he had concluded that an economical load for a shovel to carry was 20 pounds. Mr. Taylor's conclusions made him decide upon a 21 pound shovel for handling ore, earth, rock, coal and other materials. Inasmuch as this standard has been accepted by some, and shovels are being manufactured for the different materials to carry this load, the writer has adopted it as his economical load and now recommends it.

The general sizes of shovels manufactured and sold are known as Nos. 1, 2, 3, and 4. Nos. 1 and 4 are in little use, but Nos. 2 and 3 are used extensively. No. 2 is preferred in some sections of the country and No. 3 in other localities. Most manufacturers make these sizes of shovels, but a No. 2 of different manufacturers may vary a little in size.

These sizes run through the various types of shovels, such as square and round pointed, scoops and forks. Such sizes were not determined upon with a viewpoint of carrying a scientifically gauged load, but to carry a fair load and meet a popular demand. No. 1 is the smallest size of shovel made by most manufacturers, but a No. 0 is made by a few makers.

The 21 pound shovel is designed to carry an economical load and is based upon scientific principles. In speaking of a 21 pound shovel it must be

understood that a man does not obtain such a load every time he shovels, but it is an average load, varying at different times in the same man's hands up to 25 per cent, which means a difference of 4 or 5 pounds. Thus the load may go under 21 pounds and upon other occasions over that amount.

In order to obtain a shovel carrying an average load of 21 pounds in different materials, it is evident that the size of the bowl must vary with the class of material that is to be handled, and we must accordingly give up numbering the sizes of shovels and refer to them as sizes to handle different kinds of material, as an earth shovel, a rock shovel, a concrete shovel, a crushed stone shovel, a coal scoop, and so on. One manufacturer has adopted this method, and ultimately the others are likely to come to it, when shovel users learn what it means to them to use a shovel carrying an economical load.

The laborer using a shovel puts forth so much energy in an hour. Give him any shovel, even one half worn out, and so long as it does not bother him he will continue to work with it, even if the shape and size are wrong. He is working for his wages and cares little about the tool in his hand. Consequently change the tool. Make the handle of such length as to allow him to work with greater ease and more rapidity. Make the shape such as to hold the load without spilling part of it, and so the man can drive it into or under the material easier. Make the size such as to shovel a cubic yard in one hundred loads instead of one hundred and fifty, and it is evident that the man's work will not be made harder or even as difficult, yet the amount of material handled will be decidedly increased in spite of himself and in many cases without his knowledge. But one old shovel kept on the job with those of modern de-

sign may mean to lose out in effecting a change; for the men will cry out for the old shovel carrying the smaller load, thinking it will benefit them.

The points shown in this article embrace the main principles of scientific shoveling and the results obtained are almost beyond the comprehension of the man who has not studied the subject. In most cases a saving of about 10 per cent can be made by using a long handled instead of a short handled shovel. The saving effected by the proper shape and size is more difficult to calculate, for it depends upon the kind of material that each man is handling and the shape of the shovel he is using. The size of the shovel can effect a saving from 10 to 50 per cent. So it is easily possible to save on the entire operation about 25 per cent, a saving in almost any operation that should amount to a thousand dollars or more in a season. Put such an economical tool into a laborer's hands and offer him a bonus and the increased money he will earn for himself will be small as compared to the extra profits it will make for the owner.

In considering the proper load for a shovel, it must be borne in mind that the economical load decided upon is the average for the average man. Thus a man using a 21 pound shovel will move, in whatever class of material he is working, that number of pounds (average) at each shovel load.

If a man cannot handle such a load and keep up with his co-workers, then he is not suited for economic shoveling and should be placed at other work. This is a part of shovel management. A man may be a poor shoveler, but a good picker, or he may be suited for sledging or attending to a machine. It is seldom that a man is utterly worthless.

The blade of a No. 2 shovel is approximately 10 inches wide and 12



inches long. This is for a square pointed, plain black or polished shovel. A round pointed shovel is generally made about an inch longer and half an inch narrower. The two shovels if of the same size or number, will hold the same load in the same class of material. Some manufacturers differ from others in the dimensions of their shovels, but it will only be by the fraction of an inch.

In shoveling ordinary earth, it takes almost 150 shovelfuls to make up a cubic yard. The average load on such a shovel of this size is from 12 to 13 pounds. As the economic load is 21 pounds as has already been pointed out, it is evident that the No. 2 shovel load is but 60 per cent of this economic load. This means that a properly designed shovel for average earth will carry one and two-thirds times the load of a No. 2 shovel, consequently it will take but ninety shovels loads of the new type of shovel to make a cubic yard. Add a long handle to this and the amount of work done is increased. These are theoretical figures for the man who knows how to shovel and they cannot be obtained from every man, but it is an easy matter to increase the work of any shoveler if the art of shoveling is understood.

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At a board meeting of the Southeastern Portland Cement Company, recently, W. Jordan Massee was elected president; Geo. P. Diekmann, vice-president; John T. Moore, chairman of the board of directors; J. E. Satterfield, secretary-treasurer and E. B. Weatherly, attorney. This company has acquired more than 600 acres of land near Ainslie, Ga., 30 miles south of Macon, and the plant which will be erected at Ainslie, will cost approximately \$1,500,000 and will employ 500 men.

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The Chazy Limestone Corp. has been incorporated in Plattsburgh, N. Y., with a capital of \$300,000. The directors are: W. H. Williams, H. C. Jeffries and W. H. Higginbotham.

## Cars for Pits and Quarries

IN THE December issue of PIT AND QUARRY the first of a series of articles appeared on this subject. This is a continuation. Those interested are referred to the previous article.

There are a large number of different types of cars used for hauling sand and gravel and blasted rock. The types are not distinct, as one kind may be used for several conditions. Thus there are side dumps and end dumps, and some of them are meant for hand loading while some of the same class may be used for machine loading.

In selecting cars the first consideration should be the method of loading. If cars are to be loaded by hand they should be of a low down type. For sand and gravel, when shovels are used, the car can be higher than for loading blasted rock, where most of the work is done by men's hands.

For loading blasted rock a car should never be more than 36 inches high, and a less height should be preferred. Thus it is possible to get cars of 2-ton capacity that are not over 2 feet in height, and this means quicker and easier work for hand loading. The writer has seen some cars of which the bottoms were only a few inches above the base of the wheels, and by not using end gates or doors, large rocks could readily be rolled into the cars. As far as loading was concerned these were ideal, but it was not possible to unload them under all circumstances.

As a rule, however, it is not always possible to use such low type of cars, and in most cases the loading must be done over the sides. Thus the height of the wheel and that of the sides govern the loading height.

One advantage of the V-shaped rocker car in hand loading is that it may be tilted down so as to make it lower for loading until it is more than half

full. Few cars possess this advantage. These cars are used both in pits and quarries for sand and gravel as well as rock. High, larger size ones are also used for machine loading.

As already stated, for hand loading of stone the maximum height of cars should not exceed 36 inches. For sand and gravel when hand shoveling is done the height of cars can be from 36 to 54 inches. To go over this height means to cut down the rate of loading. These things mean much in continual operation.

The cars to be loaded by machines should never be of the low type, and it makes little difference in most cases whether they are 5 feet or more or 10 feet high, for most machines in excavating or hoisting raise their loads to such heights, and to load low cars means time wasted in lowering the loads, after they have been elevated. Thus cars to be loaded by cableways, derricks, steam shovels, draglines, cranes and other devices, should be of fair height.

In loading cars by derricks, either skips or buckets are used to first load the stone, then it is dumped into cars. This is also done by cableways and cranes. A skip is preferable to a bucket, as the skip is low to load, while the bucket has high sides. Thus very large pieces of rock that cannot be lifted by several men can be rolled by means of a bar by one man into the open end of a skip. This means the saving of much expensive boulder breaking. Men can also throw or cast with a shovel into a skip at a much lower cost than into a bucket or car.

For successful and easy dumping of skips from a crane, derrick or cableway, the skip should first be landed upon a sloping platform and then dumped as shown in Fig. 1. This prevents spilling the stone upon the ground and also saves injury to the car by the skip, both important considerations.

The next feature to consider is the size of the cars. This depends upon the method of loading, the size of the plant and the space available for dumping the cars. Too many operators decide offhand on the sizes of their cars with the result that they have a misfit plant, either with too much money tied up in cars or else the cars are either too small or too few to keep the plant at its utmost capacity.

It is manifestly wrong to have such a large car that when it is dumped its load is so scattered around the crusher mouth, or that of a screening or washing plant, that the greater part of the load has to be rehandled. This must generally be done by hand methods, so that it is both slow and expensive. The scattering of a carload of given size will depend upon the method of dumping. An end dump car, even of large capacity, shoots its load into a limited space, while a side dump car distributes its load along the entire length of the car, unless the car is built with pockets and each pocket can be so controlled as to dump separately. Thus if a side dump car is to be used and when dumping its load it must be confined to a space of 10 feet, then this sets the limit of the length of the car, and if one dimension is fixed by this and a second by the method of loading, the size of the car is decided.

With these factors decided, hand and machine loading must be considered. If men are loading cars it is well not to have too large capacity cars. A 1-ton or a 1-yard car is generally too small, for a plant is not likely to be kept at its maximum capacity with such a small car, unless they are made up into long trains, which is seldom practical. Too large a car means that the men become tired of working on a single car to load it. They lose interest in their work. It has been found for hand loading that a 2-ton car is ideal. If two men work together load-



ing a car, one of 2-ton capacity can be loaded in a reasonable time without tiring them.

If skips are used in loading cars then their capacity should range from 2 to 5 tons according to the capacity of the car, for a skip load should be the same as a car, as it is a poor economy to have a car waiting for another skip when it could be on its way to the plant.

For other methods of machine loading a large car should be used. A steam shovel will do more work loading large cars of the high type than it will loading smaller cars of low build. In this case the deciding factors must be those of dumping and keeping the load within the prescribed dumping area. A combination of a dumping skip on a long flat car will give a large bulk of a load, yet confine the dumping within a limited area.

The next feature of cars to be discussed is the method of dumping.

There are three distinct types of dump cars, end dumps, bottom dumps and side dumps. The end dumps are generally a low type of car and are either dumped by means of a tippie or else the car is run up a sharp incline so that when the gate is released the load slides out. Such cars are built to hold from 1 to 5 tons. Those meant to be dumped by a tippie are frequently named mine cars, as most coal mining cars are dumped by means of a tippie. This is a very successful method of dumping 2-ton cars as the cars are dumped clean and easily righted so that they are made ready for immediate loading.

The bottom dump cars are frequently called hopper cars as they are built in the shape of a hopper, the dumping doors being on the bottom of the hopper. For this type of car the track must be directly over the receptacle that is to receive the material, as a bin, a crusher, a screen or wasner, and as this is not always practical, this

type of car is not used extensively. Another objection to the bottom dumps is that there is seldom clearance room over the rails for the hopper doors so the car cannot be moved until the doors are raised up and locked. When operating a train this means a considerable wait after dumping cars. Even with one car and with the doors clearing the track the doors must be wound up before the car can be loaded again.

Some side dump cars are also hopper shape with a small door or gate on the sides at the bottom of the hopper. These are operated easier than the regular drop bottom hoppers. The gates on this type of car are sometimes put on the ends of the hoppers instead of the sides so that the load is dumped under the track as with the drop bottom. In selecting this type of car close attention must be paid to the angle or slope on the sides of the hopper, otherwise the material will not run out by gravity and it will be necessary to have men with shovels clean out the car. This means an added expense.

The type of side dump car in most common use is a tippie car. That is,

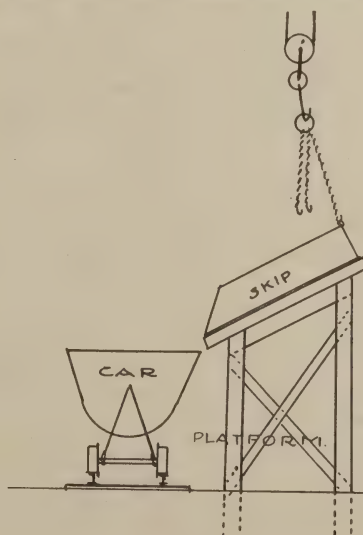


FIG. 1.

the body of the car tips over, thus discharging the car. The cars are of two kinds, a one way side dump car, only dumping on one side, and the two way dump, discharging the load on both sides, but only one side at a single dump. Some patented two way dumps can discharge part of the load at either side.

The two way dump car is the one in most common use, and these run in capacity from a cubic yard up to 50 cubic yards, but the larger sizes have their dumping mechanism controlled by air, operated from the locomotive. The smaller sizes are dumped by hand and latched up again in the same manner. A well built, well balanced car can be run on a track when tipped over for dumping as well as when in the proper position for loading, but the smaller cars that are operated by hand must be stopped to be latched up.

These cars have their sides on a swing hinge made of long steel bars, so that as they are dumped the doors swing up while the bottom goes down. There is another type of side way dump car, that shown in outline in the sketch in Fig. 1. This is a rocker dump and the load is discharged from the top over the side, and loaded in the same way. The cars are frequently spoken of as V-shaped and are generally an all-steel car. They have been used quite extensively in some sections of the country in quarries and in sand pits.

These are all of the general types of cars that are adopted to use in pits and quarries. They are made in many varying designs and sizes, but the special designs are for extraordinary conditions. It is not possible to describe and illustrate all the designs and shapes in one article. Some of these will be shown later.

There is one other type of small car that has not been mentioned and that is the rotary dump car. This car body swings around on its truck through an

arc of 360 degrees and thus can be loaded and dumped from any angle. Thus it can be loaded from the side and dumped from the end or *vice versa*. It is only used for small operations, but it has a decided advantage in some places.

Another and the last consideration in selecting cars is whether or not they are to be operated on level tracks or upon an incline. The incline will limit the size of the car and in most cases will call for an end dump car. It likewise means that gates must be used on the car to keep stone or other material from falling out.

It is not always possible to arrange the tracks to suit all conditions when an incline is used as when tracks are laid level on the ground. An incline may be used to pull up loads as from pits, and also for loads to run down when the bank or ledge is located above the plant. The same type of cars can be used in each case.

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## Talc and Soapstone Bulletin

The Bureau of Mines has added to the fund of material which it is making available with reference to the mineral industries, by the recent publication of an extensive bulletin on talc and soapstone.

As would be expected, this bulletin is written by Raymond B. Ladoo, who has specialized in this subject, and it takes up the mining, milling and uses of these products to the extent of 130 pages.

This bulletin, No. 213, gives all the information on these materials one could ask for and is a notable addition to mineral literature.

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The Niagara Gypsum Co., of Buffalo, N. Y., has increased its capital from \$150,000 to \$1,000,000.

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The Sisquoc Gravel Pits, Santa Barbara, Cal., have just completed the installation of one of the best equipped gravel and sand washing and screening operations on the Pacific coast. Mr. F. H. Gates is the owner of these pits.



## Road Building Delayed

### Political Fight in Ohio Holding Up Much Needed Work

By Our Cincinnati Correspondent

An open break between Leon C. Herrick, Ohio state highway director, and Governor A. V. Donahey, in which Mr. Herrick has been asked to resign his position, has almost completely stopped highway construction in Ohio and is occupying the center of the attention of the basic material industry of Ohio as well as the political discussion.

The governor's demand for the resignation followed closely on the heels of his written statement to the state senate in which he declared that the road material interests were said to have a stranglehold upon the highway department as now operated.

Governor Donahey in his remarks to the highway director showed where the estimated costs for a road near Cleveland was \$106,000 a mile, while a road near Cincinnati was to cost \$87,000 a mile. Governor Donahey says that if such expensive roads are to be built the counties should bear the expense. He further asks that in every case where bids are asked for expensive brick and concrete roads, bids be likewise received for cheaper types such as macadam or gravel. Finally the governor has refused to permit the state director of finance to pay money on old contracts awarded by the highway director, and as a result practically the entire plans and program of the state roads have gone asunder.

When Director Herrick, who is a Republican holdover, while Governor Donahey is a Democrat, refused to tender his resignation, the governor has of late shown a better attitude toward co-operation with the highway department, and it is now hoped that the road program will soon go forward.

While state roads are not progressing, federal and county appropriations are moving right along. This month a number of contracts were awarded by counties in southern Ohio for concrete roads, and Secretary of Agriculture Henry C. Wallace has granted Federal aid in road building in Clermont, Jackson, Washington, Fostoria, Fremont and in a few northern counties.

The outlet for basic materials in Ohio is greater than usual this spring. The main cities of the state are enjoying building booms, such as they have never experienced before. The city of Cincinnati continues to show an increase over the first quarter. In fact building construction in Cincinnati according to statistics for the first three months is double the amount of the corresponding period of 1922 and 1921. This has contributed greatly in the increased demand for sand, gravel, cement and stone. Prices are ruling firm, and tending slightly upward, a factor which in some cases is causing buyers to study closely the situation and causing hesitation in closing contracts. While no actual shortage of supplies is noticeable, cement manufacturers practically have withdrawn quotations from the market, and with shipments of cement only fair there seems little opportunity to accumulate any surplus stocks.

Prices in most cases continue as the same scale as last month. Washed gravel at \$1.50 f.o.b. cars, sand at \$1.20 f.o.b. cars are present quotations. The main change in prices this month is a \$1.00 raise in lime per ton. As all sand and gravel pits are being worked, this material is 25c lower, as it is shipped direct from the pits, and the 25c charge to transport sand and gravel from stock piles which was in vogue over the winter is now omitted.

The river operations of the T. J. Hall Company are increasing each week. Mr. Hall reports that not only is business satisfactory at the present time but that business on the books over the summer will be sufficient to allow full operation. The high water handicap of the past winter has now passed, and improvement is steadily looked forward to.

Four of the five operations of the Ohio Ballast Gravel Company are being worked at this writing, and close after the first of May the fifth pit of this company will be started again according to Mr. E. Zimmerman, manager. The greatest part of the production of the Ohio Ballast Gravel Company finds its way in the form of ballast for the railroads. The roads are buying more ballast this spring than in many past seasons. The Ohio Ballast Gravel Company has contracts to supply ballast within a radius of 150 miles of Cincinnati for the B. & O., Big Four and L. & N. railroads,

## Sand Ass'n. Activities

### Campaign for Suitable Concrete Aggregates Progresses

By Our Washington Correspondent

The National Sand and Gravel Association's nation-wide campaign for the use of suitable materials in concrete construction is progressing favorably and promises to show excellent results, according to T. R. Barrows, executive secretary. In connection with the campaign, Mr. Barrows states that in two important instances in widely separated parts of the country the National Association has secured the elimination of unsuitable materials and substitution therefore of sand and gravel that will mean the construction of enduring concrete in these particular and important instances. The attitude of the National Association toward the suggested conference of the construction industry is stated by Mr. Barrows to be as follows:

"Due to the agitation which has followed Secretary Hoover's letter to the President recommending that the government hold off its building work at this time, it is reported in some quarters that the President is considering the calling of a conference of the construction industry for the purpose of determining whether 'it is advisable to devise ways and means of curbing tendencies toward runaway prices.' It is considered by many that the calling of such a conference would be disastrous. Whether purposely or otherwise, it would give an impression that the price of building materials had reached unreasonably high levels, and that the President, recognizing this, was attempting to force price reductions.

"The latest figures of the Department of Commerce indicate that the price of gravel delivered on the job increased only four points in February, 1923, as compared with February, 1922. This is certainly not an unreasonable increase when it is considered that there were severe transportation difficulties in the industry at that time and that an unusually prolonged winter had prevented many producers from opening up their plants. It would seem that this year at least the government might abstain

from interfering with the building industry, either through priority orders or efforts to beat down prices of materials through 'conferences,' which never have accomplished anything and never will."

Consideration of plans for the 1924 annual convention of the association will occupy part of the time of the executive committee at its next meeting. It is said at headquarters here that there is already a strong sentiment among the membership for holding the next annual meeting at St. Louis. It is believed that not less than 300 actual producers of sand, gravel and crushed stone will attend the meeting.

The Department of Commerce announces that, according to reports made to the Bureau of the Census, the value of products of establishments engaged primarily in the manufacture of brick, tile, terra-cotta, fire-clay products, non-clay refractories, and pottery amounted to \$278,546,800 in 1921, as compared with \$283,342,100 in 1919 and \$172,864,000 in 1914. For the "brick, tile, terra-cotta, fire-clay products, and non-clay refractories" industry, the value of products reported for 1921 was \$194,329,400, which was a decrease of nearly 7 per cent from 1919, but an increase of 43 per cent for the seven-year period, 1914 to 1921. For the "pottery" industry, the value of products in 1921 was \$84,217,400, which was an increase of 12 per cent over 1919, and 128 per cent for the seven-year period, 1914-1921.

Of the 2,151 establishments reporting in 1921 for the two industries combined, 354 were located in Ohio; 295 in Pennsylvania; 122 in Illinois; 113 in New Jersey; 109 in New York; 105 in Indiana; 87 in Iowa; 65 in California; 60 in North Carolina; 58 in Missouri; 55 in Texas; from 25 to 49 each in Alabama, Colorado, Connecticut, Georgia, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Tennessee, Virginia, Washington, West Virginia, and Wisconsin; and the balance were distributed among 23 other states.

Authority for completion of the topographical survey of the United States, now being made by the Geological Survey, a work which would mean much in the development of good roads, is to be asked of the new Congress. A measure providing for completion of this survey, was intro-



duced by Representative Henry W. Temple, of Pennsylvania, but as action upon it at the last session did not materialize, it is likely it will be introduced at the next session. The Temple bill empowers the President to utilize existing government agencies in this work, provides an appropriation of \$950,000, and authorizes cooperative agreements with and the receipts of funds from any state or civic subdivision.

A large stone-cutting plant that will give employment to 200 skilled mechanics will shortly begin operations in Alexandria, Va., just across the Potomac River from Washington. The promoters have purchased the old Agnew shipyard, at the foot of Franklin street. The stone will be hauled to Alexandria on barges from Aquia creek. The quarries at this place have been abandoned for more than a century. New York, Washington and Richmond capitalists are said to be interested in the enterprise. The promoters have already placed orders for two traveling cranes and have made negotiations for the purchase of barges. The central portion of the United States Capitol, the first section of the Treasury Department, the old patent office and the Post Office Department buildings on 7th street were, with many other of the first public buildings in Washington, erected from blocks cut from stone ledges on Aquia creek.

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## National Slate Meet

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### Important Matters Considered at New York Gathering

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The meeting of the National Slate Association, held on Friday, April 20th, at the Commodore Hotel, New York City, may be considered among the important meetings of that body. Matters of vital concern to quarry managers, producers and distributors were discussed and action was taken that will undoubtedly benefit the industry in its various units.

The features of the program were a very good paper by the Chicago Director, Mr. C. H. Davis, reports of the Advertising Counsellor, Traffic Manager and Better Production Methods Committee. The Electrical Slate

Producers held a special conference before the regular meeting at 10:30. At the beginning of the general sessions was a discussion on the question, "What is the sales policy and how can good relations be established with jobbers, dealers, roofers and other slate contractors?" This discussion was led by Mr. E. L. Seabrook of the National Metal Contractors Association.

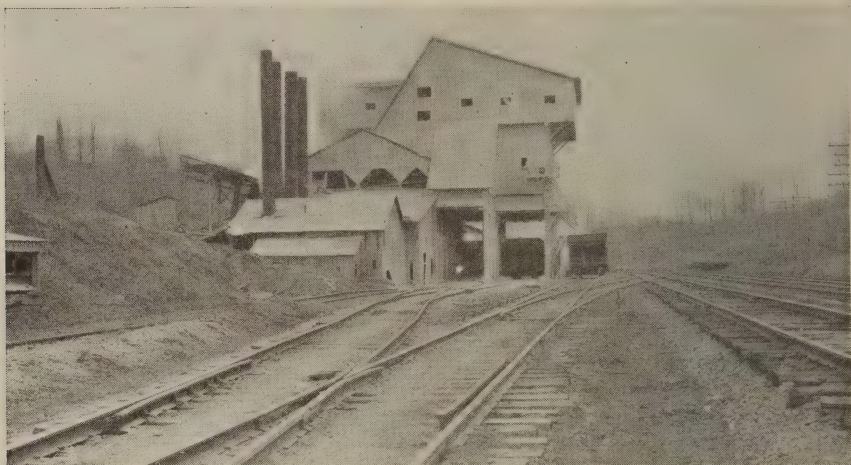
After this the Credit Recommendations Committee made its report on the kind of information service that the association should furnish. Then came discussion of the nature of slate exhibits, where they should be placed, and what should be the basis of cooperation of members in supplying necessary specimens for samples.

The report of the Better Production Methods Committee considered the development of the wire saw for use in quarries and the adoption of the broaching method of channeling which will do away with the large amount of slate shattered by the use of channeling machines. The diamond tooth saw and the carborundum tooth saw were also considered, but it is stated that experiments with these have not yet been carried along to an extent that would lead the Committee to recommend immediate installation of saws of this type, but the Committee feels that there are possibilities that have not yet been developed. The Committee recommends consideration of the possibility to increase the number of working days and thus allow the laborer to feel some certainty of working at his trade. The larger use of machinery is the great need of the industry as a whole. If the association members are willing to install improved machinery for all operations, machinery builders will take up the subject and by experiment, develop improved machinery for the quarry man.

Under the head of election of officers, the attending membership returned the officers of the last year and added to the present list of directors the name of Mr. W. S. Ditchett of the Columbia Bangor Slate Company of Bangor, Pa.

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The Sterrett Sand and Gravel Co. has been incorporated at Springville, N. Y., with a capital of \$20,000. The incorporators are F. W. Sterrett, W. Sunderland, H. A. C. Grotke, and H. A. Ward, attorney.



View of Plant of Blue Ridge Quarry Co's Plant Taken from Scale House

## Quarrying Blue Ridge Limestone

An example of a crushing plant that has been driven hard, and is still standing up and giving good service is furnished by the plant of the Blue Ridge Quarry Company at Blue Ridge Springs, Va. This operation is one of a group of similar ones controlled by Mr. W. W. Boxley of Roanoke, Va., a well-known member of the National Crushed Stone Association. In addition to the Blue Ridge plant the Boxley interests include quarries at Pembroke and Pounding Mill, Virginia.

The activities at the Blue Ridge quarry are under the direction of Mr. J. B. Dunkin, superintendent. Mr. Dunkin came into the business of commercial crushed stone production from the railway field. He is an experienced rock man and has come out more successfully than some railroad men who enter the commercial crushed stone business. His change from one phase of stone production activity to another brings to mind a statement of Mr. W. H. Finley, president of the Chicago and Northwestern Railway Co. At the annual banquet of the National Crushed Stone Association in Chicago last January, Mr. Finley said that, because a railroad is an operating and not a manufacturing operation and because railroad men have a training that is different from that of quarrymen, they do not make good quarrymen. Mr. Dunkin's case

seems to be one of the exceptions to the rule.

At this operation there is a practically unlimited supply of material. A whole mountain of limestone lies ahead of the quarry in the direction of present development. Tests have shown that there is a supply of limestone underneath the floor of the present quarry to a depth of 200 feet. If the Blue Ridge quarry is closed down any time during the next hundred years or so, it will hardly be for lack of stone.

The material itself is a hard blue limestone. The inclination of the strata is about 40 degrees. The bedding is contorted in many cases and makes drilling and blasting difficult matters. The quarry face, as exposed at the present time, runs from 30 to 140 feet in height. At points of the quarry where this high face is exposed, development is carried forward in 30 foot benches.

Tripod drills and well drills are used in blasts. Snake-holing is resorted to in about every shot to clear away the face clean down to the quarry floor. At the present time, most of the drilling on the faces is being done by the tripods and a Sanderson-Cyclone gasoline drill is used for well drilling on one face. A Clipper well drill and a Keystone well drill, both powered by steam, are be-



ing used to drive 5 inch holes preparatory to blasting for a new quarry floor level. The air equipment used includes 5 D44 Ingersoll-Rand tripod drills and a number of B 13 jack-hammers, also the product of the Ingersoll-Rand Co.

At the present time stripping is being carried on by a No. 31 Marion dipper. The stripping is being done at the end of the quarry nearest the plant and alongside the industrial railroad on which the stone is hauled. When this stripping is finished and the stone underneath has been shot away, the quarry will be opened up a great deal and better haulage methods made possible.

Six-yard dump cars are used for conveying materials. These are of the side dump type, and discharge either to the right or to the left. There are 18 of them in the fleet. Six are products of the Kilbourn & Jacobs Company and six of the Western Wheeled Scraper Company. These are hauled by steam locomotives of which there are four—a Baldwin, an American, a Porter and a Vulcan. The haulage system is standard gauge, making it possible to use any of the locomotives for spotting railroad cars and for handling the other work for which standard gauge equipment is required.

After the stone has been blasted

down by 40 and 50 per cent dynamite it is picked up by a No. 61 Marion shovel with a  $2\frac{1}{2}$  yard bucket. Trains of the 6-yard cars hauling the excavated stone are then drawn to the plant and dumped at approximately the level of the quarry floor. Dumping is done by a Curtis air hoist, located in the ground and operating a rod which tips the car to discharge its load.

The material goes first to a No. 12 Allis-Chalmers crusher. Another air hoist is provided at this point to handle stones that jam or bridge at the crusher opening. The No. 12 crusher is set to reduce stone to 2-inch size.

From the No. 12 crusher, the material goes to a bucket elevator 100 feet between centers and with buckets 32 inches wide, the whole operating at an angle of about 45 degrees. This elevator discharges at a rotary screen 60 inches in diameter and 16 feet long, equipped with perforated metal with 2-inch openings. The minus 2-inch stone from this screen goes to four 48-inch finishing screens with 4 sections each, from which are secured minus  $\frac{1}{2}$ -inch, plus  $\frac{1}{2}$ -inch minus 1-inch, plus 1-inch minus  $1\frac{1}{2}$ -inch, and plus  $1\frac{1}{2}$ -inch minus  $2\frac{1}{4}$ -inch.

Material rejected by the 60-inch screen is taken up by a No. 8 Allis-



A "Shot" at a Point in the Quarry Near the High Face

Chalmers crusher. The product of this machine goes to a bucket elevator, 90 feet between centers and with buck-

ets 30 inches wide. This elevator discharges at two 16-foot by 48-inch rotary screens, which send to the bins a product ranging from between  $\frac{1}{2}$ -inch and 2 inches. Rejections are taken up by a 30-inch belt conveyor, 50 feet between centers and carried to a No. 37 Kennedy gearless crusher which gives a product of plus  $\frac{1}{2}$  inch minus  $1\frac{1}{4}$  inch. This goes direct to bins.

Rejections from the 60 inch by 16 foot screen used at the beginning of the process go to a 24 inch belt conveyor, 80 feet between centers which takes the stone to a 48 inch screen, 16 feet long equipped with metal perforations. The product of this screen goes to a bin containing stone from  $\frac{1}{2}$  to 1-inch, and the rejections to a bin of their own from which they are drawn off as a separate product.

Power is furnished to the plant by three boilers operating at about 110 pounds pressure and delivering about 375 H. P. These boilers, manufactured by Houston, Stanwood & Gamble Company of Cincinnati, are equipped with shaker grates made by the Princeton Foundry Company, of Princeton, West Virginia. They drive 2 Corliss engines, which turn over the machinery of the plant. One of these engines takes care of the No. 12 crusher, the 60-inch screen and the 100-foot elevator, the first three pieces of equipment in the process. The other engine moves all the other machinery. From the boilers is also run an Ingersoll-Rand compressor that feeds a



Clipper and Keystone Steam Well Drills at Quarry Floor



Part of Face is Worked by Well Drills.. A Sanderson-Cyclone in Action



The Highest Point of the Face. 140 Feet High





View of the Plant from Direction of Quarry—Quarry Track in Foreground

tank at the plant. From this tank is run an air line to another tank in the quarry. Air lines from this quarry tank are used to operate the air tools.

A standard gauge supply track running past the plant and up to the quarry, permits the convenient handling of coal for the power plant. This track runs beside and above the coal bins, and fuel is very easily unloaded. This supply track running back to the quarry also results in other conveniences, such as the easy transportation of machinery received from the railroad and intended for the quarry.

There is at this quarry a very convenient loading track arrangement. Cars are taken in from the main line of the Norfolk & Western Railroad and passed to one or another of the three loading tracks, running under the stone bins. Of these three tracks, one is used for loading ballast, another for commercial sizes and concrete mixes, and the third for small stone and dust. The track has a capacity of 65 empties. At the outside of the track arrangement there is space for 85 loaded cars. Loaded cars pass by a scale house in which the weight, as shown by a Fairbanks-Morse track scale, is read by a representative of the railroad who issues a receipt to the quarry.

The Consumers Sand Co., of Allis, Neb., and the Central Sand Co., of Central City, Neb., both operated by Trenmor Cone, of Waterloo, Neb., have been consolidated and incorporated under the name of the Consumers Sand Co. Trenmor Cone, president; G. H. Gray, vice-president.

The Pittsburgh Plate Glass Company of Pittsburgh, Pa., is engaged at the present time in putting in the foundations for a new 2,500 barrel cement plant at Fultonham, Ohio, which they expect to have in operation within the next year. The company is doing the engineering work themselves, working in conjunction with the J. C. Buckbee Company, who are acting in the capacity of consulting engineers. The contracts for practically all the buildings and machinery, including the boilers and power house equipment, have been let. The installation includes waste heat boiler system to generate steam from the waste heat of the kilns.

The Pilot Knob Gravel Co., Winchester, Ky., has decreased its capital from \$250,000 to \$160,000, and changed its name to the Pilot Knob Sand and Gravel Co.

The Standard Scale & Supply Corp., of 1631 Liberty Avenue, Pittsburgh, Pa., has purchased, and is now operating under entirely different management, the business formerly conducted by the Standard Scale & Supply Co. This new corporation, which has branch offices in New York, Philadelphia, Cleveland and Chicago, is preparing to manufacture the highest grade scales, concrete mixers and contractors' equipment. R. H. Chappel is secretary-treasurer.

The Fairmont Sand Co., has been organized at Fairmont, W. Va., with a capital of \$50,000. Dalton D. Simon, Mona Simon, S. C. Board, D. W. Carpenter and S. B. Miller, all of Fairmont, W. Va.

# Hand Book Well Received

The distribution of PIT AND QUARRY Hand Book throughout our industries during the past month has already established itself as an event of more than ordinary importance. The attractive and permanent make-up of the volume in well-bound hand book style, has been a pleasing surprise, as this was scarcely expected in view of the free presentation of a copy to every producer in the United States and Canada.

This is the first time in the history of the pit and quarry industries that such a work has been attempted, and its distribution on the same basis as that of PIT AND QUARRY, free to every producer in the field, and supplementing the service we have been giving for several years through our publication, is meeting with hearty appreciation.

The information contained has also been recognized at once as well worth bringing together in this easily accessible form. Here, for instance, are just a few questions which can be answered by reference to the book:

What parts of the country produce the most sand and gravel? (See map on page 28.)

How is blast furnace slag used in the manufacture of cement? (Page 35.)

How are rotary kilns used in lime plants? (Page 58.)

What is the process of preparing phosphate rock for market? (See flow sheet on page 75.)

How are demurrage charges computed? (Page 88.)

What was the date of the 1922 convention of the National Lime Association, and where was it held? (Page 103.)

Who is president of the Talc and Soapstone Producers Association? (Page 109.)

What is the treatment for electric shock? (Page 113.)

How far from a public highway must we build a storehouse for 8,000 pounds of dynamite? (Page 117.)

How much glass sand is produced in the United States? (Page 124.)

What is a drag twist? (Page 163.)

What horsepower is required to run an air compressor with a piston displacement of 250 cubic feet per minute at a pressure of 125 pounds? (Page 193.)

What is the weight of a rocker dump car, 40 cubic feet capacity, 36 inch gauge? (Page 205.)

How is wire rope made? (Page 296.)

Who and where is the nearest steam shovel salesman? (Page 305.)

Who makes dust collecting systems? (Page 317.)

Where can we get special motor truck bodies? (Page 321.)

Who makes the Keystone drills? (Page 328.)

That this mass of information is appreciated is attested by a multitude

of letters from those who have received the book. Here are extracts from a few:

This book is well dressed, polite and sociable. It is a first-class information bureau and one of the greatest chapters ever written for our industry. PIT AND QUARRY has pitched a ringer.—A. P. Sandles, Secretary National Crushed Stone Association.

Please accept our thanks for the Hank Book recently presented to us. It is replete with useful and valuable information, so that when we say we appreciate the courtesy shown we express it but mildly.—C. H. Kammann, General Manager Ste. Genevieve Lime Company, St. Louis.

We wish to thank you for the Hank Book which you mailed us a few days ago. It is certainly very complete in every detail and we appreciate it very much.—Central Wisconsin Supply Co., Beaver Dam, Wis.

We desire to thank you for copy of 1923 Hand Book, which we are sure will prove very useful to operators of sand, gravel and stone plants.—R. B. Tyler Company, Louisville, Ky.

In this morning's mail it was my pleasure to receive a PIT AND QUARRY Hand Book for 1923. In glancing through this publication it appears to be chuck full of interesting and valuable information and I wish to thank you for your kindness and generosity in sending it to me.—W. M. Gray, Louisville Cement Company, Louisville, Ky.

I received your PIT AND QUARRY Hand Book, and wish to congratulate you on getting up a volume with such a mass of satisfactory detailed information.—J. F. Schroeder, Linwood Cement Company, Davenport, Iowa.

We wish to acknowledge with thanks the copy of the Hand Book for 1923. We will keep same on file for future reference. At times when we order any equipment shall be glad to mention the Hand Book.—Clinton Sand & Gravel Co., Clinton, Iowa.

We have received copy of your 1923 PIT AND QUARRY Hand Book, for which we thank you and wish to congratulate you on the completeness of the same. This information should be of material benefit to all producers and others interested in the industry.—N. K. Wilson, Executive Secretary Wisconsin Mineral Aggregate Assn., Milwaukee, Wis.

Within the past few days I have received a copy of PIT AND QUARRY Hand Book for 1923 published by your company, which is quite the niftiest offering that I have gotten my hands on for some time.—H. J. Love, Secretary-Treasurer National Slag Association, Cleveland, Ohio.

Manufacturers taking catalogue space in the book are also well pleased. One of them got an inquiry from the book before his own copy reached him, as related in one of the letters reproduced below:

We have your letter of the 17th in reply to our telegram, inquiring when we may expect Hand Book. Our reason for requesting copy at once was due to an inquiry we received and mentioning the fact that ad was seen in the PIT AND



QUARRY Hand Book. Thinking perhaps the book was already distributed and some slip made in mailing us copy, prompted us to wire. Needless to say, the ad took immediate effect and we wish to take this opportunity of congratulating you upon the very attractive and well edited Hand Book treating on this field.—Arnold & Weigel, Woodville, Ohio.

We wish to congratulate you on the PIT AND QUARRY Hand Book which arrived this morning. This is certainly a credit to your organization, as it is not only attractively bound but well printed and contains a wealth of good information covering the entire field. We are indeed pleased that we took hand-book space sufficient to let one properly "peep" at our line, as we note that some of the cuts used by various advertisers are entirely too small to give an adequate idea of just what they represent.—Morris Machine Works, Baldwinsville, N. Y.

## British Quarry Men

### Will Hold Annual Meeting in June at Llandudno, North Wales

The annual conference and general meeting of the Institution of Quarry Managers of Great Britain will be held at Llandudno, North Wales, on June 28, 29 and 30. The program includes visits to limestone, roadstone and slate quarries and an explosives factory.

Among the papers to be read at the conference are:

"Portmadoc Slate as a Roofing Material." by Capt. E. Andrewes.

"Liming the land—the importance of Agricultural Lime." by George Mann Watson, B.A.

"Lime-Burning — the Economization of Fuel." by Dr. Oliver Bowles, Bureau of Mines, U. S. A.

"What is the Best Aggregate for Tar-Macadam." by A. B. Searle, Consulting Technologist, Sheffield.

The president, Sir Henry P. Maybury, Director of Roads, Ministry of Transport, will take the chair at the annual general meeting on Friday, June 29, at 3:00 p. m. and will preside at the annual dinner on Friday at 7:30 p. m. Headquarters will be at the Marine Hotel, Llandudno.

Any American managers who are in England on the dates mentioned are given a cordial welcome to attend the conference. Further particulars will be gladly given to those interested, on application to the secretary, Barclays Bank Chambers, Carnayon, North Wales.

## Agstone Research Man

Prof. Firman E. Bear, chief of the soils department, Ohio State University, has secured the services of Carl W. Vandervort, who will graduate from the College of Agriculture this summer, to do review and research work for the Ohio group of the National Agstone Association.

His monthly bulletin will be a thorough review of what is doing in agstone throughout the country. This service will be paid for by the Ohio group, but a copy of this bulletin will go to the entire membership of the National Agstone Association.

Prof. Bear advises that he and other members of the faculty of the State University will censor and approve Mr. Vandervort's bulletin before it is broadcasted. This practically insures Agstone producers that this bulletin will be official and along safe and scientific lines which both producer and purchaser will be safe in following.

Some members will order from 500 to 2,000 copies of this bulletin to be distributed by them in their territory.

## Lime Convention in New York

The fifth annual convention of the National Lime Association will be held at the Hotel Commodore, New York City, June 13, 14 and 15, 1923.

The work of the convention will be devoted in a large measure to reports from the technical men of the research organization, and from the field engineers of the association.

Robert F. Eissler, who during the past two years has filled the position of assistant to the vice president of the Chicago Pneumatic Tool Company, New York, being desirous of doing more active sales work, at his own request has assumed his former position as district manager at Pittsburgh. The appointment is announced of Nelson B. Gatch as assistant to vice president, headquarters at New York, succeeding Mr. Eissler. Appointment is also announced of William C. Straub as district manager at New York, to succeed Mr. Gatch, promoted.

## Big Texas Program

### Will Take All Materials That Producers Can Get Out

By Our Dallas Correspondent

Increased building operations and greater activity in road building and street paving have served to increase the demand for sand, gravel and other building materials in Dallas and other Texas cities. Building operations are especially active in Dallas at this time, and most of the building is of such construction that large quantities of sand and gravel are being used. Numerous Texas counties are just now entering upon their road building programs, work having been delayed during the winter months, and other counties are preparing to vote bonds or have already voted bonds and these are to be sold before construction of highways begin.

Gravel dealers in and near Dallas report that they are hard pressed to keep up with orders, and in some cases delays in deliveries result from their inability to meet the demand made upon their plants. All the gravel pits are working full time.

The spring so far has been favorable for working gravel pits, as there has been no flood and the pits have remained practically clear of water. Rains have made roads near Dallas difficult of passage and have thus hindered the gravel business where deliveries are made by truck, but the trade as a whole has suffered little inconvenience on account of rainfall.

Prices have remained firm, with a slight tendency to advance as the demand for sand and gravel has increased. Gravel f. o. b. pits in Dallas is quoted at \$1.50 to \$2.00 per cubic yard. Sand is quoted at the same prices for the pit-run product, while washed sand is quoted at practically double this figure. Most of the concrete work in Dallas is done with pit-run product, as the gravel found in most of the pits near Dallas is mixed in proper proportions of sand and gravel for good concrete work, and the contractors save the expense of handling sand and gravel separately and then mixing them in the making of concrete.

Ballinger, Texas, is fast developing into an important gravel market

center, and large gravel pits are being opened along the Colorado river in that section. Gravel from these pits is being shipped to all parts of west Texas. The Colorado River Gravel Company has recently delivered 100 carloads of gravel to the City of Abilene for street paving work. One hundred carloads of gravel were shipped to Winters, Texas, for paving work. Coleman county has contracted for 400 carloads of gravel for road construction in that county.

Numerous highway construction contracts in various parts of Texas have been awarded recently. Smith Bros. of Dallas, Texas, were awarded contract for building the Meridian Highway through Frio County. This contract calls for expenditure of approximately \$750,000 and will consume several hundred carloads of gravel.

County Commissioners of Fayette County, sitting at Lagrange, awarded contract for graveling roads in Fayette county to Kelly & Co. of San Antonio, for \$42,504.20.

The Julian C. Field Construction Company of Bonham, Texas, was awarded contract for building 5.78 miles of concrete highway near Honey Grove, for \$174,629.57.

Dallas County Commissioners awarded contract for construction of the Irving-Coppell highway to Scarborough, Smith & Davis of Dallas, for \$306,000. The road will be built with a crushed rock foundation with a surfacing of one-inch cold mix asphalt for eight miles, while the other sixteen miles will be of gravel construction.

A shortage of gravel is reported in Houston, Texas, due to the heavy demand resulting from building operations. Most of the gravel used in Houston is shipped from pits near Columbus, Texas, and the pits there have been overworked in an effort to meet the demand. Large building operations in Houston include the 1,500 foot concrete wharf on the Houston Ship Channel, the million dollar reinforced concrete cotton concentration plant and the Masonic Temple.

Liberty County has awarded contract for construction of a 34-mile stretch of concrete highway through the county, for \$414,000. The Tibbetts Construction Company has the contract for culverts and bridge work.

W. M. Jagoe & Co., of Denton, Texas, has been awarded contract for paving West Oak Street in Denton



for a distance of more than one mile. The paving is to be of crushed stone foundation with a two-inch surfacing of rock asphalt.

The city of Sherman has entered upon an extensive paving program, and contracts covering the paving of about five miles of streets have been awarded to McGuire & Canvendar, paving contractors of Sherman.

Stephens County, Texas, has awarded contract to W. S. Davidson for building a gravel highway, 8 miles in length, from Breckenridge to Wayland, for \$18,846.

Tyler County, Texas, awarded contract to the Sherman Road Construction Company of Houston, for building a highway with crushed rock and gravel about 40 miles in length crossing the county. Native stone and gravel will be used.

On a bid of \$80,514.27, Falls County, Texas, has awarded contract for construction of nine miles of hard surface highway in Falls County. The Hannar Construction Company of Waco, Texas, is the successful bidder.

The City of Commerce has awarded contract to the General Construction Company of Fort Worth, Texas, for paving several streets. A total of 30,000 square yards of pavement will be laid with an outlay of more than \$125,000.

The City of Laredo, Texas, has awarded contract for pavement on 106 city blocks of its streets at a cost of \$420,000.

The Womack Construction Company of Sherman, Texas, was awarded contract for building 12 miles of gravel highway in Taylor County, Texas, at a cost of \$61,000.

The City of Abilene, Texas, has entered on a campaign of street improvement which includes the pavement of several streets, aggregating twelve miles of streets.

Waco, Texas, has accepted the bid of the Central Bithulithic Company of Dallas, Texas, for street pavement. The bid was \$2.89 per square yard for rock base with two-inch wearing surface, with maintenance contract covering a period of five years.

Brazoria County has issued bonds in the sum of \$160,000 for construction of highways, and will begin building gravel and shell roads.

Stamford is building 5,346 lineal feet of gravel highway, cost of which is being borne by the business men of the city.

Dallas, Texas, has contracted to purchase 3,000 tons of crushed stone from the Thurber Earthern Products Company of Thurber, Texas, at \$2.40 per ton. The stone will be used in construction of the Turtle Creek Boulevard.

Galveston County, Texas, has contracted to purchase 10,000 tons of mud-shell, which is used in the construction of roads on the Texas Coast in lieu of gravel. The contract price was 65c a ton in cars with state tax paid.

## No Salaries In Ohio

### Sand and Gravel Association Reduces Dues Accordingly

The annual meeting of the Ohio Sand and Gravel Producers' Association was held at Columbus on March 28.

A considerable part of the session was devoted to outlining definite plans for the present year.

One action taken was the adoption of a resolution setting forth that, "beginning with January, 1924, the Ohio Sand and Gravel Producers' Association shall discontinue paying any salary to any of the officers of the association and that the fee for each member shall be a nominal fee of \$25 a year."

It is expected that this policy will result in the enrollment of every sand and gravel producer in the state.

The officers for 1923 are as follows:

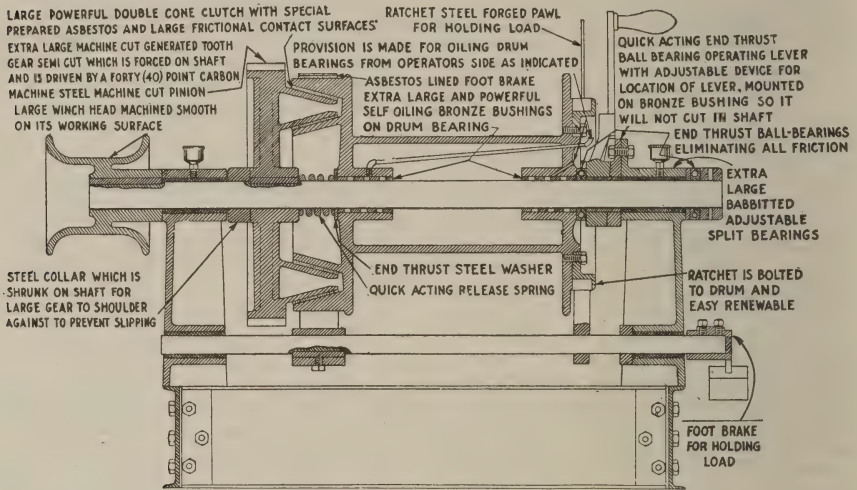
President, F. E. Hall, of T. J. Hall & Co., Cincinnati.

Vice-President, E. A. Evans, of Zanesville Washed Gravel Co., Zanesville.

Secretary-Treasurer, F. C. Fuller, Portsmouth Sand and Gravel Co., Portsmouth.

Executive Secretary, Guy C. Baker, Greenville Gravel Co., Greenville.

The plant of the Mid-Coast Rock Company, Santa Barbara, Cal., is rapidly nearing completion. The latest types of equipment for handling the rock are being installed and a spur line is being built from the main line of the Southern Pacific Railroad Co. so that the rock can be transferred direct from the crusher to the cars. Mr. A. W. Belmont is vice-president and general manager.



## How a Hoist Works

The above illustration is of unusual interest as showing the action of a hoist in detailed fashion. It is taken from catalogue No. 20 recently issued by the O. K. Clutch and Machinery Company, Columbia, Pa., and of course shows the particular type of hoist manufactured by this company.

The O. K. line includes single and double drum hoists, for both light and heavy duty, operated by gasoline engines, or provided with pulley for belt drive.

This company also makes a combination outfit whereby a second or third drum can be added to a single drum outfit.

## Anderson Factory Expands

Work has been started by the Anderson Foundry and Machine Company, of Anderson, Indiana, on a building expansion program, involving the construction of new buildings which will increase the interior space of the factory 41,000 square feet and will add 200 employees to the present pay roll. Ground has been broken and structural steel was ordered over a month ago. All buildings will be constructed of steel, concrete and glass, similar to the ones now occupied by the company. When the installation is complete it will give the company 200 per cent more capacity than it has at present.

## Haiss Truck Loading Unit

The usual truck loading machine is one built complete with a digging and elevating mechanism mounted on a specially designed chassis and provided with a unit power plant. The George Haiss Manufacturing Co. of New York City has laid out its truck loader designs in such a way as to offer complete loading units for mounting on a chassis of any suitable motor truck.

The manufacturers claim for this truck that it is possible to travel at a good speed over any road, thus effecting an economy of time over the standard loading machine. It can be moved rapidly from place to place, where loose material is to be loaded, because the unit can do double duty and drive the loader as well as the truck. The loader can be mounted and dismounted as occasion requires. The unit is of lattice-truss construction. The buckets, elevator, chain and sprockets are the same as those used in standard Haiss machines. Loader units may be provided with Haiss positive self-feeding propellers which push the material directly in the path of the bucket. Standard height under the discharge chute is 9 feet.

In writing for information, operators are requested to specify the make of truck, when each truck was made, capacity and horse-power. Inquiries should be addressed to the George Haiss Manufacturing Co., 141st St. and Rider Avenue, New York City.



## New Seaverns Publications

Pamphlets issued by the James B. Seaverns Company, 122 South Michigan Avenue, Chicago, describe in some detail the Seavern truck loader, Seaverns service bins and the Seaverns balanced shaking screen. These three publications also carry good illustrations of the several articles of Seaverns manufacture with which they are concerned. The bulletin on truck loaders contains a half-tone illustration and a line sketch of the device, together with text description and tabulated specifications. The folder on the shaking screen carries also a good description of this device and a print of a typical installation. The literature on service bins is very attractively prepared and shows one of the service bins at an actual operation. Copies of these various pamphlets may be had by addressing the James B. Seaverns Co., at the address given above.

## Schaffer-Alles Chemical Company Introduces "Piercite"

The Schaffer-Alles Chemical Co., of 2828 Smallman St., Pittsburgh, Pa., announces that it is putting on the market a new compound, Piercite, which, when added in small amounts to hydrated lime, is said to make a perfect lime plaster that will stay uniform and harden on the wall in a few hours. The company claims for itself the rediscovery of the ancient secret of lime plaster manufacture, lost since time immemorial.

Mr. J. C. Schaffer, president of the Schaffer Engineering and Equipment Co., is president of the Schaffer-Alles Chemical Company. Mr. A. A. Alles, Jr., is vice-president and treasurer, and Mr. M. L. Kittell is secretary. Interested in the new concern are also Mr. James H. McNamara, president of the Eagle Rock Lime Co. of Eagle Rock, Va.; Mr. L. P. Dillon, president of E. Dillon Sons, Inc., Indian Rock, Va.; Mr. Douglas M. Harrison, Pittsburgh, and Mr. H. H. Pierce, Indianapolis.

The company has already received shipments of hydrated lime from quite a number of lime manufacturers for the purpose of showing that an application of Piercite will convert it into

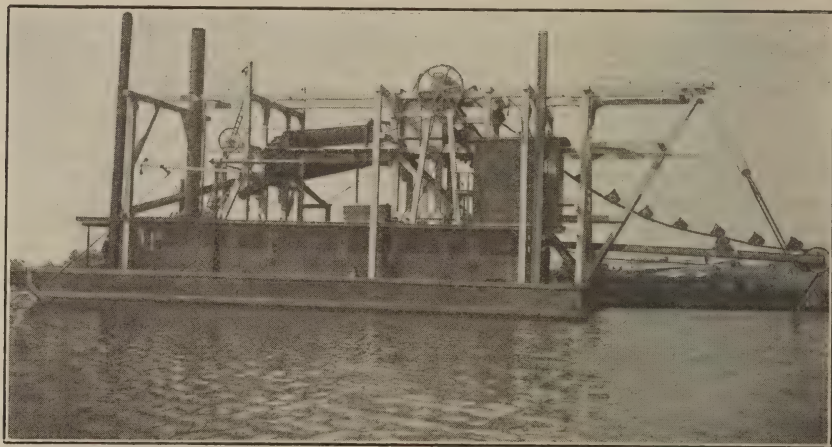
good hard wall plaster. The interested parties have been working on this quietly for a long time and they say that they have now demonstrated the practicability of their plans to their own satisfaction. They claim that Piercite wall plaster will go more than half again as far as patent plaster, that there is no setting or no hardening in the mortar box, that mortar left over from the night before can be retempered and used just as well as the fresh mix, that Piercite wall plaster has been put on walls alongside patent plaster and at the end of a number of weeks has shown up much better, that the time of the setting of the plaster can be controlled more easily, that it will adhere to any kind of wall, and that it forms a suitable material for the making of blocks and molding.

The Schaffer-Alles Chemical Company will manufacture and sell Piercite compound to the lime manufacturers, who in turn will mix it with their hydrated lime and sell it in bags to the dealers. Further information may be secured by writing the Schaffer-Alles Chemical Company at the above address.

## New Good Roads Catalogue

The new catalog just issued by the Good Roads Machinery Company, Inc., of Kennett Square, Pa., is a very fine piece of work, both as to the way in which it is edited and the manner in which it is laid out and printed. The Good Roads people call this catalog "Everything for the Road Maker," and they do not overstate the case a bit, for there does seem to be in it a description of just about everything that a road maker would require. In it, too, there is much that would be of interest to the producer of gravel and crushed stone. The Good Roads Machinery Company's crushing, elevating and screening equipment is thoroughly described and illustrated. Copies of this attractive publication may be had by addressing the Good Roads Machinery Co., Kennett Square, Pa.

C. E. Wilfert is expecting to open a gravel crushing operation between Eugene and Springfield, Ore. Mr. Wilfert is negotiating with the Mountain States Power Co. for the construction of a power line from Springfield to the plant.



## Dredge of Economical Design

The dredge here illustrated and described was recently put in service by an operating company on the north Atlantic seaboard. It was designed and built by the Ellicott Machine Corporation of Baltimore, and is of the elevator type of sand and gravel dredge. The first machine built by this company of this type was in 1906, which machine is still in successful use. During the past seventeen years these dredges have been developed and improved until today this company offers a machine which commends itself in every feature to the discriminating operator.

First, it is a comparatively low priced machine. Second, it can be operated by a small crew and at a low cost. Third, it can readily produce 300 tons of sand and gravel per hour. Fourth, it screens, washes and grades its products, in one operation. Fifth, the dredge can be carried over land to navigable streams by being knocked down and then assembled in the stream in which it is meant to work, while it can be towed to any place by water. These are the essential features of this successful dredge.

The illustration shows the completed dredge equipped for work with ladder raised to show the bucket line. The hull is 90 feet long and 35 feet wide and has a depth of 9 feet. Although the hull can be built of steel, yet it has been the practice to construct it throughout of sound merchantable long leaf pine. The keelson and ribs

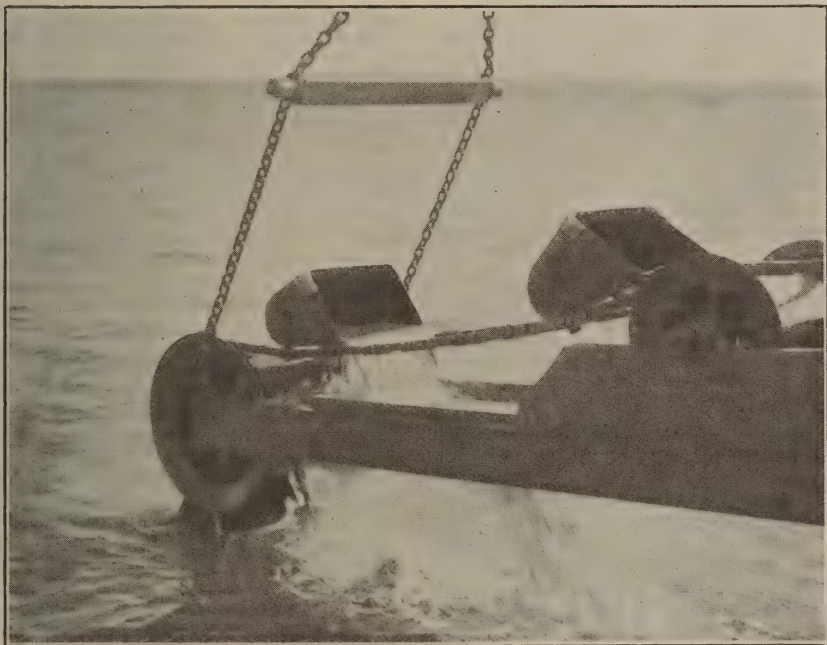
are of such size and so placed as to give the greatest possible strength and stability to the boat. These are well braced with knees. This particular machine is meant to dig a depth of 35 feet and the ladder and four spuds are of ample length to permit this. Spud wells are provided inside the hull. The winding engine that handles the boom also handles the spuds.

Living quarters are located on the main deck, and are of ample size to accommodate a crew of from 12 to 15 men. These quarters are conveniently arranged. Besides providing sleeping accommodations there is provision made for a refrigerating room, kitchen, mess rooms, bath and lavatories. Naturally the machinery, pumps and engines are installed in the hull, but the operating room is in the superstructure, being located to the right of the well, above the main house, so that the operator has a full view from this point, and thus controls all the operations. The heavy frame work, shown in the photograph, supports the elevator and screens, and is so constructed as to distribute the load as evenly as possible over the hull, thus making the dredge seaworthy.

The boiler is of economic type, being 125 H. P., built according to the standard A. S. M. E. specifications, for 100 pounds working pressure. This and a 15 H. P. donkey boiler furnish ample steam for all the work. With the exception of a few commercial articles, the dredge is an Ellicott product throughout, both in design and construction.

The boom with the excavating buck-





ets and elevator on it is 50 feet long, and is operated by the winding engine. One of the photographs shows a view of a bucket line, there being 28 buckets, each having a capacity of 7.63 cubic feet, struck measure. These buckets discharge at the rate of 15 per minute onto a grill which eliminates all the oversize material.

The material dropping through the grill goes through a wash box that feeds it into the screen. It is in this wash box that water is applied to the product, by means of 5 inch water jets. Water is furnished for this purpose by a high duty centrifugal pump, direct connected. This pump has a 12 inch suction and 8 inch discharge, thus furnishing ample water for washing purposes.

The screen, which is equipped with a jacket, is 17 feet long and 6 feet in diameter over all. This screen separates the sand and gravel and screens the sand in two ways. The rejected gravel is sent over the stern of the boat. The remainder passes into an auxiliary screen where it is separated into two grades or sizes. The gravel is chuted onto scows along one side of the dredge and the sand to the other side.

The buckets and elevator and also

the screens are operated by the main engine, the second engine doing the winding, as previously explained. The dredge is also equipped with an electric light plant, which not only furnishes light for the living quarters but also for night operations. Thus if service of scows can be given to the dredge, operation can be carried on throughout the 24 hours of the day. This means a larger output and materially reduces the overhead cost.

Ample bunkers for coal are provided, as well as the necessary feed and service pumps, and also a feed water heater. This means economical coal consumption. If fresh water is difficult to obtain, the steam plant is made condensing, there being installed a service condenser, air and circulating pump, filter box and hot well.

Although the hull of the dredge illustrated is of wood, yet it can be constructed if necessary of steel, thus preventing teredo or other wood destroying worms from injuring the hull.

One of these dredges has lately repaid its owner its cost in eight months, showing in a striking manner the large output that is obtained, and the low cost of operation, and that the price is reasonable for this type and size of dredge.

## Expectation Realized

### Tonnage is Big Consideration in Eastern Markets

By Our Eastern Correspondent

The expectancy of heavy business with the advent of the spring season has come to pass in the sand, gravel and crushed stone markets in the eastern districts. Never, within recent months, has there been a more pronounced call for materials, and never, in this same time, have producers been more on edge with regard to immediate business. Deliveries are now being slated for several weeks ahead, as even capacity production will not insure the prompt dispatch of orders, and each must wait its turn.

Building material dealers show no hesitancy in stocking up; in fact, they are more anxious to secure tonnage than are the producers in supplying the demand, and simply because the trend of trade shows that the company with a reserve on hand in the immediate weeks to come is going to be in the best position to give all around satisfaction to customers in general.

Labor continues as a handicap to the situation. Sand and gravel pits are having difficulties in filling their working quotas, as prophesied in the last issue of PIT AND QUARRY, and the keen demand for common labor continues unabated. Wage scales have been advanced to meet the schedules established in other branches of trade and a fair degree of success has followed this action.

Plants in the Cow Bay section of Long Island, as well as in the different producing districts of New Jersey and Eastern Pennsylvania, are now practically all on the active list. The railroad situation is not of the best, and the call for cars brings but a percentage of the desired number. Those plants which are shipping by water are more fortunate, and better deliveries are being recorded by this means of transportation.

As to be expected in view of the demand for stocks, prices are holding strong at established levels, and will likely continue at present figures, if not at a fraction or so higher, well through the spring and summer periods. There is a growing call for crushed stone and cement for spring

road construction, and millions of dollars of business are in sight in this branch of the industry, taking all cost factors into consideration. The state of New Jersey alone is arranging for a fund of \$6,000,000 for permanent road-building during the coming fiscal year.

Crushed stone maintains at \$1.65 and \$1.75 per cubic yard in carload lots, f. o. b. New York, the first quotation being for 1½-inch stock, and the latter for ¾-inch material. These figures have prevailed for some few months past. Dealers are holding to a \$4.00 level for both sizes, retail.

Selected gravel has moved to \$2.25 a cubic yard, both 1½ and ¾-inch stocks, in cargo lots, wholesale, as compared with a previous quotation of \$2.00. The new level is satisfying and good distribution is being recorded. A year ago at this time, the market was moving under a \$1.75 rate. Dealers are still selling at \$2.75, delivered on the job, but it is expected that this price will be advanced to \$3.00 at an early date.

Good river sand continues at the \$1.00 a cubic yard level for wholesale quantities, but there is a strong tendency for an advance. Producers cannot afford the present labor schedule, and hold to a figure which has been current for practically a year past. Dealers are selling the material at \$2.00 and \$2.25, the latter price having recently been established by a number of yards. Fine white sand is still being retailed at \$4.50 a cubic yard.

As expected for several weeks past, following an advance in labor scales at the cement mills, an increase has come about in the wholesale cement market at New York. With a previous quotation of \$2.60-\$2.70 for truck deliveries, the present figures are \$2.70-\$2.80, with the latter prevailing. For cement alongside dock to dealers and contractors, \$2.30 a barrel, less bags, still holds, but with every indication that this will be \$2.40 very soon. Dealers have not as yet increased the retail rate, and this maintains at \$3.20 delivered on the job, with current bag rebate of 10 cents.

Hydrated and lump lime show no change in the figures given in the last issue of PIT AND QUARRY. Spring construction work has ushered in a strong demand for both classes of material, and dealers are maintaining the best possible stock to handle the incoming call. Particularly heavy de-



liveries are going forward in the Brooklyn district, where extensive house construction is under way.

Granite quarries and plants at Concord and other producing districts in New Hampshire are developing maximum output to meet the current demand from all parts of the country. Practically every quarry is giving employment to a full working force, and the recent wage advance has gone to make for more general satisfaction among the men. It is expected that the present production schedule will be maintained for some months to come.

The Laurel Brick & Sand Co., operating at Laurel, on the Connecticut River, near Middletown, Conn., is planning for the opening of a granite quarry on its local properties and will be active in this line with a large working force during the spring and summer months. The company recently disposed of a portion of its land to the Benevue Co., lately organized, which will develop feldspar deposits, but has retained a tract of about 450 acres for its own use.

The Stonington Granite Co., Stonington, Me., has been organized under state laws with a capital of \$100,000, to operate a granite quarry in this section. B. Lake Noyes is president; George B. Noyes, Jr., treasurer; and G. Howard Noyes, clerk and representative, all of Stonington.

Waldron Shield, Barre, Vt., a local granite operator, has recently been elected mayor of the city.

Fire, April 15, in the stone-crushing plant of Sweeney & Boland, Wolcott Road, Rochester, N. Y., contractors, caused a loss estimated at \$12,000. It is planned to rebuild at once. The plant has been arranging for an active season and the company is said to have considerable work on hand.

The East Flatbush Stone Corporation, Brooklyn, N. Y., has been formed under state laws with a capital of \$5,000, to operate a crushed stone business. The new company is headed by A. J. Clayton and De V. Chilton. It is represented by F. S. Chilton, 44 Court street, Brooklyn.

The George W. Maltby & Sons Co., Buffalo, stone contractors, operating a works at 21 Maryland street, will commence the immediate erection of a new one-story addition at the plant for general production service, estimated to cost about \$6,000.

James Kerney, Trenton, N. J., and

Joseph Quigg, Newark, N. J., Federal receivers for the Eastern Potash Co., New York, with plant at Raritan Township, near New Brunswick, N. J., are perfecting plans for a reorganization of the company, and propose to pay the creditors in full. The plan covers the formation of a new company to take over the present assets, and giving stock for existing debts. It is also purposed to place the plant in operation as soon as possible, and establish the project on a going basis. According to a late appraisal, the present assets of the company aggregate \$1,012,544, and as a going business, the valuation is placed at \$1,382,328.

The De Frain Sand Co., Philadelphia, Pa., will commence the immediate erection of a new building at its sand and gravel distributing plant at Twenty-eighth and Christian streets, estimated to cost about \$22,000.

Slate quarries at Slatington, Pa., are running full and a large volume of orders has been received for spring and summer deliveries. A number of the plants are feeling the labor shortage and an effort is being made to secure more men. Wages have recently been advanced. About 30 men at the plant of the Parsons Brothers Slate Co., Pen Argyl, recently declared a strike, following a dispute regarding wages. The company arranged for an advance, but the amount was not satisfactory to the men. The works are running on a curtailed basis until an agreement can be effected.

The Benvenu Coal Co., Marysville, Pa., recently organized with a capital of \$20,000, has plans in progress for the operation of a dredge for the production of sand and gravel, as well as river coal. It is expected to develop a large output as the season advances. The company is headed by Chester S. Sheaffer, Harry J. Deckard, and William J. Donovan, all of Marysville.

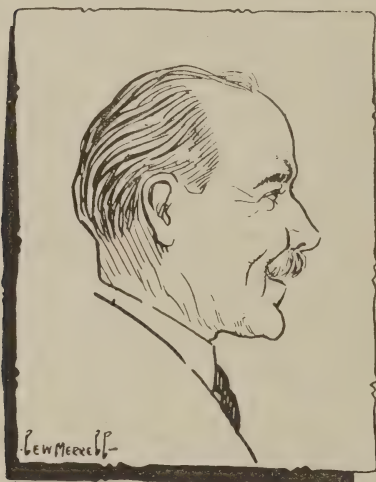
The National Cement company, which is headed by Isaie LaPlante of Fall River, Mass., is planning to erect a cement mill in Montreal East, Quebec, Canada, which will have a capacity of 3,000 barrels daily. Mr. Isaie LaPlante of Fall River is president; Manuel Sylvia, New Bedford, vice-president; Edmond Cote, Fall River, treasurer and general manager. It is expected that ground will be broken about May 1st, 1923, and the mill will be in operation Jan. 1st, 1924.

## Sloan in City Office

### Granite Man to Head Chicago Board of Local Improvements

John J. Sloan of Chicago, secretary of the Wisconsin Granite Company and a well-known producer and association member, has been selected by Mayor Dever for the presidency of the board of local improvements in the new administration. And Mr. Sloan has accepted, on the understanding that he will be given an aggressive board whose sole policy will be to benefit the city.

This is considered by Mayor Dever and his advisers to be the most impor-



John J. Sloan of the Wisconsin Granite Co.

tant by far of all of the cabinet positions remaining to be filled. The mayor is anxious to do something for the city and one opportunity lies, in his opinion, in the board of local improvements.

His ability, training and experience fit him for the job of directing the work of local improvements. He is a product of the Armour institute. He was chief clerk of the department of public works years ago when it handled the special assessment work. Later he was superintendent of the bridewell and made a remarkable success of it. He has been trained in special assessments, engineering, paving materials, and in construction.

It is reported that Mr. Sloan has not promised to remain in the city service during the mayor's entire term, but has consented to stay only a limited period.

## Safety Association Gains Ground

Forty-six chapters of the Joseph A. Holmes Safety Association have been formed in 16 states, as follows: Pennsylvania 9, Indiana 6, Virginia 4, Michigan 3, New York 1, Tennessee 2, Colorado 1, North Dakota 5, Florida 2, Illinois 6, Montana 2, Alabama 1, California 1, Missouri 1, Washington 1 and West Virginia 1. Phases of the mining industry represented include bituminous and lignite coal mines, copper mining, gold mining, lead mining, salt mining, phosphate mining, and petroleum refining. Individual membership of chapters is approximately 1,600 full members and 70 junior members. Some of the chapters have women members.

Chapters have been formed in the majority of cases in connection with the first aid and mine rescue training activities of the Bureau of Mines of the Department of the Interior. Mining companies have cooperated in numerous instances with chapters in the furnishing of charter fee and first aid supplies. Several safety societies with a record of safety accomplishments extending over a period of years have affiliated with the Joseph A. Holmes Safety Association.

Activities of the various chapters have thus far consisted of first aid training and retraining to chapter members; participation of chapters in state and local first aid contests; rescue apparatus work at mine fires and explosions; first aid treatment of accident cases by various chapter members; motion picture displays of a safety or educational nature staged by various chapters; public meetings of chapters featuring lectures and addresses by available speakers; smokers; suppers; entertainments; establishment of chapter club rooms in several instances; and a "safety week" campaign put on by an Indiana chapter.

The River Sand and Gravel Co., 5th and Market Sts., Camden, N. J., has been incorporated with a capital of \$125,000.



## Cement at High Mark

### First Quarter of 1923 Doubles Five-Year Average

Production of portland cement during March was unusually heavy for this season of the year, according to a bulletin of the Portland Cement Association. Mills of the country produced nearly 9,900,000 barrels, almost 2,000,000 barrels more than in February and nearly 50 per cent more than in March, 1922. Production for the quarter ending March 31 was considerably more than 35,000,000 barrels as compared with an average of slightly over 17,000,000 for that quarter during the five year period, 1919-1923.

Shipments from the mills during March, 10,300,000 barrels, established a high mark for that month and were more than 47 per cent greater than in March, 1922. For the first quarter of the year shipments were 21,500,000 barrels, a quantity greatly in excess of the amount moved in any similar period and approximately 54 per cent higher than the average for the five year period, 1919-1923.

Stocks of finished cement in manufacturer's hands decreased about 450,000 barrels for the month or less than 4 per cent.

It is impossible to state how much of the amount shipped during the first three months has actually been used. From the unusual amount of winter construction which has been carried on, it is safe to assume, however, that the quantity used is greater than in any similar period. It is also a fact that greater quantities than heretofore have been stored up by the highway departments of a number of states, contractors and others in order to avoid transportation difficulties which are expected to increase when the active construction season opens.

In a recent report, Secretary of Commerce Hoover has recommended to President Harding that the different divisions of the Government be directed to initiate no new work that is not eminently necessary to carry on the immediate functions of the Government. One of the reasons assigned is that "Transportation facilities, available for the building materials are fully loaded and almost constant car shortages are complained of with consequent interruption in production";

also that "labor in the construction trades and in the manufacture of materials is not only at full employment, but there is actually a shortage in many directions." Such action on the part of the Government would tend to relieve the transportation and labor situation somewhat, but it cannot be foretold to just what extent.

The situation so aptly described by Secretary Hoover is particularly true of the cement industry. The problem is not one of capacity to produce, but rather of the transportation of enormous quantities of raw materials and fuel supplies and distribution of the finished product. In some sections the question of an adequate supply of labor is also an important factor. In the industry's largest year—1922—the amount of cement which could be moved resulted in operation of only about 80 per cent of capacity. This year it is anticipated that capacity will be considerably expanded by the completion of several new mills and additions to existing plants.

Mr. John Karscher, of Celina, Ohio, has recently bought the Troy Huey Quarry at Portland, Ind. Mr. Karscher is planning to install machinery and equipment to cost in the neighborhood of \$100,000.

The Bucyrus Company, South Milwaukee, Wis., announces the removal of its Chicago office on May 1st from 622 McCormick Building to new quarters, Room 1015, Corn Exchange Bank Building, 134 South La Salle Street.

The El Cerritto Quarry Co., Oakland, Cal., has been incorporated with a capital of \$25,000. Attorney, E. E. Keves, Federal Realty Bldg., Oakland.

The Sound Sand and Gravel Co., Seattle, Wash., has been incorporated with a capital of \$50,000. W. R. Chesley, A. S. Kerry and J. W. Kerry.

The Bogeda Materials Co. has been incorporated at Aldridge, Ill., with a capital of \$200,000 to own, lease and operate stone, sand, gravel, quarry, tile, cement and kindred products. The incorporators are James C. Emory, Oskaloosa, Iowa, Thomas Aldridge, Wolf Lake, Ill., and R. E. Renfro, Carbondale, Ill. The principal office of the incorporation will be located in Murphysboro, Ill.

## Production at Peak

### Cement Mills Off on High for a Record-Breaking Year

Peak production prevails in the cement mills in the Lehigh Valley district of Pennsylvania. There is an unprecedented demand for material for all branches of the construction trades, with road-building coming well to the front in line of call for immediate deliveries, and practically every mill is doing its best to supply the requirements. It is said that throughout the spring and summer months there will be no curtailment in operations, only such as may be necessitated in the line of equipment repairs. The prospects are for a record-breaking year.

The spring call for freight transportation in all lines of trade, has resulted in fewer cars for cement shipments in this section. The noticeable scarcity is in box cars, and the railroads are falling far short of the necessary tonnage quota for daily dispatch. Up to a few weeks ago there was a noticeable improvement in the freight situation, and it is expected that as the weeks go by a more normal condition will ensue. In the meantime, other means of conveyance are being pressed into service, with motor trucks doing fine duty in connection with reasonably nearby hauls. Philadelphia is securing a large amount of material in this way.

The labor situation is relatively fair, despite the fact that there is a marked shortage of common labor. Mills are doing their best to fill up the present gaps in the working force, and recent wage advances have been made to correspond to those granted by the iron and steel interests in order that the men will not quit their jobs and seek employment in one of the nearby plants of this character, and which has occurred in previous years. Skilled labor in certain branches of cement mill service is equally hard to secure, and current indications point to a still greater shortage in the months to come.

The fuel question is righting itself in substantial fashion, and local mills are in first class condition in this respect, with each day showing the trend for improvement. Coal is fairly abundant and a number of the plants are

The Lehigh Portland Cement Co., Allentown, Pa., is running full at its different mills in this district. The New Castle plant is developing a heavy taking the opportunity to lay in a reasonable reserve.

output and employment is now being given to about 800 men at this works. The company has granted a wage advance of 10 per cent, effective April 1, at all mills. An increased scale has also been operative in office and other such departments, the exact amount of such advance not being made public. The Ormrod and West Coplay plants are very busy and a large tonnage is moving from these points. Additions are being made in the working forces at a number of the mills.

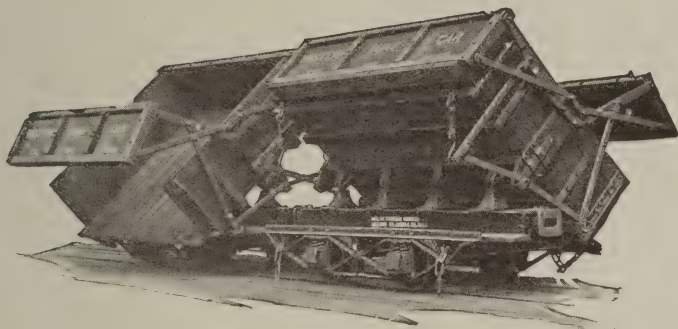
All plants at Coplay, Pa., are on a capacity basis, and there is a call out for more men at a few of the plants. The Coplay Cement Co., is running at both of its mills, known as Plants B. and C., and with equipment repairs recently completed, it is expected that continuous production will continue for an indefinite period. The company has adopted an increased wage scale for common labor and other departments, following the advance made by the other prominent mills in this section.

The Atlas Portland Cement Co. continues under heavy output at its large plant at Northampton, Pa., as well as at the smaller mills at Coplay and other points. The company was among those to lead in adopting a 10 per cent wage advance for all employees in the producing and operating departments early in April, and the new scale is now in force. Recent additions have been made in the working quota, and it is said that the company still has a call out for more men, despite the fact that over 6,000 operatives are now on the payroll. The Northampton mill is now on a full production basis, as are the other plants of the company in this district.

The Alpha Portland Cement Co., Easton, Pa., is one of the heaviest producers in the Lehigh Valley region at the present time, and has advanced the output at a number of its mills. There is a heavy call for material from New York and the Northern New Jersey districts, in which territories the Alpha company has large distribution. A wage advance of 10 per cent has been made effective at the plants, and extensive additions have been made in the working forces in a number of de-



# Speaking of Dump Cars



"I wish they were all Westerns," said the quarry Superintendent at Independence, Mo. "Western cars do not get out of order so quickly and when they do they can be repaired more easily."

That is the story in a nut shell—increased production, lessened cost of maintenance. Your haulage system is the key to production.

**Western**

*That's  
Why*

Let us refer you to the nearest plant which is using Western Dump Cars.

Write today.

**Western Wheeled Scraper Company**

**Earth and Stone Handling Machinery**

**AURORA, ILLINOIS**

partments during the past six weeks. Progress is being made in the line of extensions and improvements at the Martin's Creek mill, referred to in the last issue of PIT AND QUARRY, and this work will be pushed to completion. F. M. Coogan, a vice-president of the company, suffered a painful fracture of the shoulder when he fell from a horse he was riding at the Northampton Country Club a few weeks ago, being confined to his home at Phillipsburg, N. J., for a number of days.

Other active companies in the Lehigh Valley district at the present time are the Bath Portland Cement Co., with mill at Bath; the Nazareth Cement Co., at Nazareth; the Hercules Cement Co., also operating at Nazareth; the Giant Portland Cement Co., at Egypt; and the Whitehall Cement Mfg. Co., with mills at Cementon. Practically all these plants have adopted a 10 per cent wage increase for operatives, and seeding out large tonnages each day. So far as possible under present conditions, full working forces are being employed.

There is no change in the mill base among the plants in the Lehigh Valley territory, the rate of \$2.10 in carload lots, without bags, being quite well established. At the same time, an advance of 10 cents in this level as the season matures would not occasion any great surprise, as the increase in operating costs is now all the more pronounced. Other districts maintaining this same base are Mitchell, Ind., where an increase recently was made to such point, Iola, Kan., Hannibal, Mo., and Mason City, Ia., the latter place having increased from \$2.05 during the last month. Buffington, Ind., and Steelton, Minn., are running on a \$1.95 barrel base, while \$2.00 is current at the mill of the Universal Portland Cement Co., at Universal, Pa. Hudson, N. Y., is among the places asking \$2.20 at the mill, and which rate is also being used at Leeds, Ala., Alpena, Mich., and Fordwick, Va.

There is pronounced activity in the line of expansion in the different cement plants in Texas. The Southwestern Portland Cement Co., El Paso, is running full at its local mill, with a large working force, and has acquired a tract of land on Sycamore Creek, near Fort Worth, for possible use for a new plant. Tentative plants are now under consideration for the new mill, which will be designed for an initial output of approximately 3,000 barrels

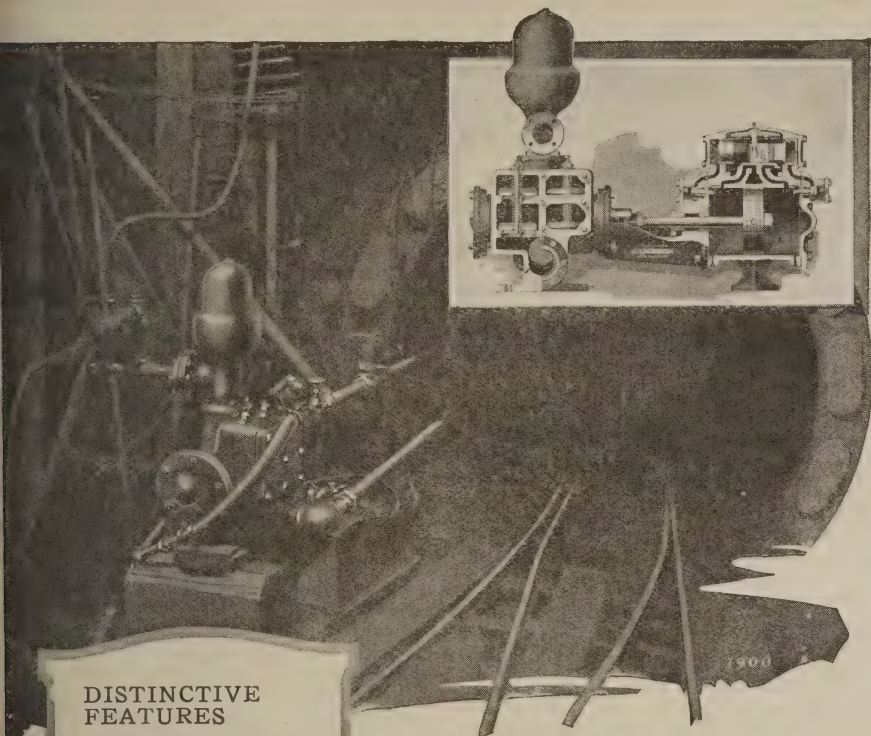
per day. The plant will consist of a number of buildings, including power house, machine shop and other operating structures, and is estimated to cost close to \$500,000. The Texas Portland Cement Co., Dallas, has work under way on enlargements at its mill near Manchester, Tex., to include the installation of additional machinery in a number of departments as well as repairs to present equipment, to increase the annual capacity to a rating of 800,000 barrels.

The Southern Portland Cement Co., Macon, Ga., recently organized under Delaware laws with a capital of \$6,000,000, has taken title to property at Ainslie, Ga., about 29 miles from Macon, comprising a large acreage with extensive cement rock deposits. Plans are nearing completion for the erection of the initial plant unit and it is expected to break ground at an early date. The complete works will consist of a number of mills, with power house and other mechanical structures, and is estimated to cost in excess of \$1,500,000. It is said that about 4,000,000 barrels of cement are consumed annually in this territory, and the company proposes to secure the bulk of this trade. The new organization is headed by W. Jordan Masse, president of the Bibb Brick Co., Macon, who will act as president of the Southern company and give personal attention to the enterprise. George P. Diekmann, chemical engineer, has been elected vice-president and general manager. E. E. Satterfield, Macon, a well known capitalist, will act as secretary and treasurer.

The Riverside Portland Cement Co., Riverside, Cal., is operating at full capacity at its local mills, giving employment to a large working force. There is a heavy call for production from Los Angeles and other sections of Southern California, and every effort is being made to supply the demand. The company is said to have plans in prospect for the establishment of a new mill on site to be selected in Arizona, and has been in communication with the Chamber of Commerce at Phoenix, for possible location here.

The Petoskey Cement plant, Petoskey, Mich., which has been closed down for repairs, is now in full operation. The company's officials predict that the year's output will reach 700,000 barrels.





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Fewer working parts than any other steam pump made.

No external valve mechanism.

Only four working parts in steam end.

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Accessibility and satisfactory operation of Cameron direct-acting steam pumps make them unequalled for general service or for use in the industrial plant and power house. The water end is fitted with acid resisting material which assures protection against chemical action where corrosive liquids are handled.

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124-S

A. S. CAMERON STEAM PUMP WORKS

*Send for Bulletin 7304*

## Spring Opening Pleases

### Pittsburgh Producers Getting All Equipment into Action

There is growing activity in the sand and gravel industry at Pittsburgh, Pa. and vicinity, and producers are enlisting all available equipment to keep pace with the call. The dredgers are busy on the rivers and large tows are being hauled to the Pittsburgh landings, as well as other points occupied by the steel companies and allied interests. The spring season has opened up in a highly satisfactory manner and there is no let-up in sight.

Washed gravel maintains at \$2.00 a cubic yard delivered on the water front, while taken f. o. b. float, the prevailing level stands at \$1.60 and \$1.65. Dealers are asking \$2.75 and \$3.00 for the material, delivered on the job, with quotations based on the length of haul. Best grade river sand is operating under a good demand, with prices holding from \$1.00 upwards per cubic yard, dependent upon the character of delivery; on the dock, a \$1.25 level is current. Crushed stone stands at \$2.85 a cubic yard in wholesale quantities, for 1½ and ¾-inch sizes. Portland cement is selling at \$2.24 a barrel in cargo lots, f. o. b. city to dealers and contractors, without bags, while supply yards are asking \$3.50 a barrel, including bags, for which an allowance of 10 cents each is in force.

J. K. Davidson & Brother, Pittsburgh, are developing a heavy capacity and their fleet is busy daily on the river. The company dredgers are in service on a full production basis, including the "J. K. Davidson." The towboat "Bronx" is making the different landings with well-loaded scows, and the material is finding a ready market. Activities will be continued on the present basis for an indefinite period.

The Rock Point Sand Co., Pittsburgh, with plant at Wampum, is disposing of large quantities of river sand and gravel, and is keeping its dredgers on the active list. It is said that orders on hand insure capacity for some months to come, particularly in the line of specialty sands for core work and other service.

The Iron City Sand Co. and the Rodgers Sand Co., are other active pro-

ducers at the present time, and the immediate call for stocks is said to be well over the normal for this season of the year. The first noted company is continuing its dredging on the Allegheny River, using the "Monarch" dredger for this service.

The East Liverpool Sand Co., East Liverpool, Ohio, is in the Pittsburgh district. A ladder-bucket type of digger is being used on the Ohio River for sand and gravel production, and large quantities of best grade material are being produced. The company also operates its own towboat, and has a fleet of fifteen barges available for the river service. A stiff-leg derrick hoist is also being used effectively for the transferring of stock from barges to motor trucks for local deliveries. A full working force is being employed.

C. B. Gould, formerly sales engineer for the Barber-Greene Co., Aurora, Ill., has recently been given charge of the Barber-Greene office at Detroit, with the title of district manager. Mr. Gould is a graduate of the University of Illinois and has had considerable conveyor experience, having been with the engineering and erection department of Stephens-Adamson Company at Aurora, before becoming affiliated with the Barber-Greene Co. During the war, Mr. Gould served as a lieutenant in the air service.

Owing to the increase of their business, the Chicago office and warehouse of the Victor Balata & Textile Belting Co. have been forced to move from their present location at 167 N. Market street. On and after May 1st, this company will be located at 345-359 W. Austin avenue, Chicago, which location will give them very improved shipping facilities, enlarged and increased space, as well as many other additional advantages.

The Daigler Sand & Gravel Co., Williamsburg, N. Y., has increased its capital from \$100,000 to \$150,000.

The Burress Gravel Company, of Shoals, Ind., is installing a washing plant at their operation in order to furnish clean gravel to their customers.

The United Sand and Gravel Company, Ft. Wayne, Ind., has been incorporated with a capital of \$25,000. Directors: F. Eubelhoer, F. M. Hogan and K. J. Stone.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7

CHICAGO, ILL., JUNE, 1923

No. 9

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*Operating a Barber-Greene Bucket Loader in a Michigan gravel pit in weather 18 below zero. Above, Barber-Greene Conveyor used in a beach sand plant near Cleveland.*

## 18° below—90° in the shade—and men

The high cost of warm weather in sand and gravel pits is becoming an increasingly powerful influence in the purchase of labor-saving equipment. Every man has his limit and in extreme weather it is reached much sooner than under average conditions.

That is why users of Barber-Greene Bucket Loaders and Conveyors are telling our representatives that the profits made with this machinery are much greater than they at first supposed.

Some bought their Barber-Greene's because they wanted to do more work with fewer men, others because they wanted to speed up output; but only a few figured in the savings made by being relatively independent of muscle power in hot and cold weather.

Olaf Oleson, of Foster City, Michigan, was one of the first to find this out. The photograph shown above shows how he operated a gravel pit when the weather was 18 below zero.

He then used only one truck and did the rest of his hauling with logging sleds. He "shot" the bank, stripped by breaking the frozen soil off in lumps, dug out the gravel with a Barber-Greene Loader and screened it with the aid of a grizzly attachment.

In spite of the extreme weather his operations show a favorable cost because he is practically independent of muscle power. In the hot weather he operates differently, but still enjoys the same advantage of having production about as "level" as it can be.

For additional information about Barber-Greene Loaders and Conveyors, and how they are being used to make up for the shortage and high cost of labor, send for our N cost reports and catalog.

Barber-Greene Company, 490 W. Park Avenue, Aurora, Illinois

Representatives in  thirty-three cities

**BARBER GREENE**  
Portable Belt Conveyors  Self Feeding Bucket Loaders



# Pit and Quarry

Vol. 7

Chicago, Ill., June, 1923

No. 9

## Program of New York Convention of National Lime Association

### Wednesday, June 13, 1923

- A. M.  
11:00 Meeting of Board of Directors.  
P. M.  
1:00 Luncheon.

#### Executive Session

(Open to Qualified Members of N. L. A. Only)

- 2:00 Opening Address.  
Charles Warner, President, National Lime Association.  
2:30 Executive Report of General Manager.

- W. R. Phillips, General Manager, National Lime Association.  
3:00 Informal Discussion.  
(Open to All Members)

The entire afternoon session is to be devoted to presenting to the Membership a full report of the business condition and problems of the Association, and to informal exchange of views by all Members regarding future Association policies. No formal action on any matters will be taken at this meeting, such action being reserved for Executive Session on Friday.

### Thursday, June 14, 1923

#### Open Session

- A. M.  
10:00 Opening Address.  
Charles Warner, President, National Lime Association.  
10:15 Report of General Manager.  
W. R. Phillips, General Manager, National Lime Association.  
Section 1—General Reports of Departments N. L. A.  
10:30 Report of Soil Technologist.  
J. A. Slipper, Soil Technologist, National Lime Association.  
10:45 Report of Construction Department.  
R. P. Brown, Construction Engineer, National Lime Association.  
11:00 Report of Highways Department.  
W. A. Freret, Special Representative, National Lime Association.  
11:15 Report of Chemical Director.  
M. E. Holmes, Chemical Director, National Lime Association.  
Section 2—Manufacturing Subjects  
11:30 Late Developments in Quarrying.

- Oliver J. Bowles, Mineral Technologist, U. S. Bureau of Mines.  
11:45 Efficiency of Lime Burning.  
Victor J. Azbe, Combustion Engineer  
P. M.  
1:00 Luncheon.  
(All Discussions and Demonstrations on the Following Papers Confined to Executive Session after all Papers have been Presented)

#### Section 3—Lime in Highways

- 2:00 A—Sub-Bases  
B—Asphalt  
W. A. Freret, Special Representative, National Lime Association.  
M. E. Holmes, Chemical Director, National Lime Association.

#### Section 4—The Lime Partition Block

- 2:30 Development and Manufacture  
W. A. Freret, Special Representative, National Lime Association.  
W. E. Emley, Chief Lime Section, U. S. Bureau of Standards.

#### Section 5—Quicksetting Lime Plaster

- 3:00 Outline of the Work of the Association on a Quicksetting Lime

M. E. Holmes, Chemical Director, National Lime Association

- 3:15 Compounds of Lime, Water and Carbon Dioxide

R. T. Haslam, Director, Laboratory of Applied Research, Mass. Inst. of Technology.

- 3:30 Carbonated Hydrated Lime as a Basis for Quicksetting Lime Plaster.

F. C. Mathers, Prof. of Inorganic Chemistry, Indiana University.

- 3:45 Effect of Burning Conditions on Time of Set of Lime Plaster.

Jas. R. Withrow, Prof. of Indust. Chemistry, Ohio State University.

- 4:00 Summary of Association Investigations in Development of Quicksetting Lime Plasters.

G. J. Fink, Research Chemist, National Lime Association.

#### Section 6—Executive Session

(Open to Qualified Members of N. L. A. Only)

- 4:15 Discussion of Foregoing Papers.  
(Open discussion)

- 4:30 Plant Problems in Connection with the Manufacture of Quicksetting Plaster  
(Open discussion)

- 5:00 Manufacturing Problems in Connection with the Lime Partition Block.  
(Open discussion)

- 7:00 The Association will be the Guests of the Valve Bag Company of America.

### Friday, June 15, 1923

#### EXECUTIVE SESSION

(Open to Qualified Members of N. L. A. Only)

- A. M.  
10:00 Election of Officers.  
(Balance of program for this session will be presented during the meeting.)

## Lime Producers Express Opinions on Wet Mortar Plan

PIT AND QUARRY recently received expressions of opinion from quite a number of lime manufacturers on the subject of the sale of lime in the form of wet mortar. The general opinion seems to be favorable to such a plan. Many producers see in it a means of regaining the lime tonnage lost in the construction field at the advent of cement and gypsum. The main thoughts brought out in connection with expressions of opinion by producers are, quite properly, that the wet mortar plan cannot be operated successfully on a long haul basis, and that such a plan can become notably successful only in large centers.

The plan is working out successfully in a number of sections of the country and, undoubtedly, would lend itself to quite a number of plants in which it is not at present installed. The adoption of this method will call, of course, for a careful, or rather a cautious, preliminary survey of the market served by the plant intending to use it.

Some expressions for and against the plan follow:

*Ozark White Lime Co., Fayetteville, Ark.*—"I think this is one of the big new features in the lime industry. We call it aged mortar or aged putty. Architects and contractors are falling for it and dealers can make money out of it. We have been working it through a dealer for a year. It improves the quality of mortar for construction work, it improves with age, and it eliminates the possibility of burning the lime while slacking on the job, which ruins the best lime ever manufactured. Year old putty is better than the day it was slacked. The Ft. Smith Terminal Warehouse Co., of Ft. Smith, Ark., have been in the business for a year."

*Hoosier Lime Co., Salem, Indiana.*—"To our minds, the lime manufacturers will have to adjust themselves and take advantage of this opportunity to offset the inroads made by the various so-called quick setting mortars and time savers. This new method will, without doubt, regain some of the tonnage lost that is essentially lime basis."

*Moore's Lime Co., Durbin, Ohio.*—"This plan is very good, providing the plant is near a large city. Conditions are not satisfactory for us; therefore, we do not follow this wet mortar plan. Several of our dealers have mortar works and from what we can gather this plan is very satisfactory."

*The Ohio Hydrate & Supply Co., Woodville, Ohio.*—"This plan is very good in cities where a plant can be located so as to receive sand at a minimum cost and avoid long haul deliveries. The wet mortar business was not profitable years ago in cities where they used the steel boxes and had long haul deliveries."

*J. F. Groth & Son, Cedarburg, Wis.*—"It appears to be a very good plan and ought to retrieve a lot of business for lime. We have followed it up to some extent, principally Mr. Hay's system, but have had no actual experience."

*M. J. Grove Lime Co., Lime Kiln, Md.*—"Excellent provided the haul is not too long. We have built several miles of concrete roads, mixing the mortar at our plant at Grove, Md., near Frederick, Md., and hauling same from 3 to 5 miles to the road."

*Arkansas Lime Co., Ruddells, Ark.*—"We think this will be worked out by plants at the large centers and that here is the best opportunity to regain lost tonnage in the plaster field. The plan is being tried by the Fort Smith Terminal Warehouse Co., dealers at Fort Smith, Ark."

*Blue Bell Lime & Stone Co., Inc., Philadelphia, Pa.*—"It was tried by one firm on a large scale in Philadelphia several years ago, before the motor truck age, and abandoned on account, we believe, principally of long and expensive deliveries."

*Henry Cowell Lime & Cement Co., Santa Cruz, Calif.*—"Quite a lot of this is being done here rather successfully. The Atlas Mortar Co., 55 Sutter St., have much experience along these lines."

*Meadows Lime Kiln, Kirtland, New Mexico.*—"The best method of selling yet discovered for the building trade."



Have only read about it, but think it will be successful."

*The Puntenney Lime Co., Los Angeles, Calif.*—"We think that's a fine proposition. There are two large mixed mortar plants here in the city, and both doing very well."

*E. Dillon's Sons, Inc., Indian Rock, Va.*—"Quality of mortar very much improved, and under favorable conditions as to location, etc., should be profitable to the seller and of benefit to the contractor."

*St. Genevieve Lime Co., St. Louis, Mo.*—"Think this may come in course of time, especially in plants in the vicinity of large centers."

*F. E. Conley Stone Co., Munns, N. Y.*—"Under certain conditions I think it would work out satisfactorily."

*Pierce City Lime Co., Pierce City, Mo.*—"Believe it good idea in large cities, big saving it seems to us."

*Lander Lime Co., Lander, Wyoming.*—"It is a good idea. We ourselves have never tried it out."

*Greer Limestone Co., Greer, W. Va.*—"A very good plan, and should be better advertised."

*Commercial Lime Co., Ocala, Fla.*—"We think well of it."

*The Luckey Lime & Supply Co., Luckey, Ohio.*—"Do not know much about it. Do not think it a very good stunt."

*J. A. Creighton & Son, Thomaston, Maine.*—"I should think a contractor or a user would be taking quite a chance in some cases."

*Berkshire Hills Co., Gt. Barrinton, Mass.*—"Do not approve."

Mr. Francis H. Davis, who since 1906 has been general manager of the Santa Cruz Portland Cement Co., at Santa Cruz, California, has recently retired and will spend the greater part of his time on his ranch at Tres Pinos. A unique testimonial was tendered to him at the time he retired, consisting of a letter from the employees, many of whom have been in the plant since 1906 and 1907. The letter was in the form of a highly embossed and artistic volume bound in Morocco and gold letter, and was signed individually by each employee in the company. Mr. Davis was very popular and successfully managed the enormous cement plant.

## Made Million and Half

### International Cement Corporation Has Promising Outlook

The International Cement Corporation for the year 1922 reports gross sales of \$9,407,725, as against \$9,172,311 in 1921. After payment of all expenses, including charges for interest and taxes, there was reported net income of \$1,425,047, as against \$1,529,900 in 1921. The net income for 1922, after allowing for preferred dividends, was equal to \$4.06 a share earned on the 324,047 shares of common stock of no par value outstanding, as against \$4.55 a share earned the year before.

The income account for 1922 and 1921 follows:

|                         | 1922        | 1921        |
|-------------------------|-------------|-------------|
| Gross sales .....       | \$9,407,725 | \$9,172,311 |
| Exp. dep. and depl. .   | 7,714,096   | 7,156,391   |
| Profit .....            | \$1,693,629 | \$2,015,920 |
| Other income .....      | 168,451     | 255,206     |
| Total income ....       | \$1,862,080 | \$2,271,126 |
| Interest, taxes, etc. . | 437,033     | 741,226     |
| Net income .....        | \$1,425,047 | \$1,529,900 |
| Preferred dividends. .  | 107,016     | 56,056      |
| Common dividends. .     | 850,633     | 738,609     |
| Surplus .....           | \$ 467,398  | \$ 735,235  |
| P. and L. surplus. .    | \$2,114,894 | \$1,501,418 |

The balance sheet shows inventory valued at \$2,074,991 at the close of 1922, as against \$2,645,315 at the end of 1921. Cash holdings aggregated \$423,008, as against \$245,007; notes receivable \$208,368, as against \$33,902, and accounts receivable, \$1,124,316, as against \$1,255,315. Notes and accounts payable totaled \$453,942, as against \$537,613.

Holger Struckmann, president, in his statement to stockholders, said:

"Your company is in excellent position both from operating and financial standpoint to benefit by the continuance of the satisfactory general business conditions which prevailed during the year 1922 in the territories served by its subsidiaries. As indicated by the report for the first quarter for 1923, the outlook for increased earnings for the current year over the year 1922 is promising."

The Glacier Sand and Gravel Co., of Mitchell, S. D., has recently been incorporated with a capital of \$50,000. The incorporators are: Wilson C. Roberts, Henry W. Hotchkiss, Richard E. Heald.

# Utilization of Waste Rock at Lime Plants

By OLIVER BOWLES

Mineral Technologist, Bureau of Mines

Most of the lime manufactured in the United States is burned in various types of shaft kilns. The fuel and limestone may be added in alternating layers, as in the pot kiln, or the fuel may be burned beneath the stone, the flames and hot gases passing up through the spaces between the rock fragments. In either method it is essential that a strong draft be maintained. In some kilns the natural draft is sufficient, others employ tall stacks, while power fans may be used for forced draft. The necessity for good draft is a great detriment to the utilization of small sized fragments of stone, for if large quantities of the finer materials are mixed with the larger masses the draft is greatly retarded and imperfect calcination results. Stone varying in size from 4 to 10 or 12 inches is employed in most shaft kilns while rock below 4 inches is either discarded or diverted to other uses.

Rock too small for use in shaft kilns together with fragments that are unsuited for lime manufacture constitute a considerable percentage of the total output at many plants. The small sized stone, though chemically as pure as the high-grade kiln stone, may be difficult to market. Some plants utilize practically all of it in various ways, others use it in part, while at many plants nearly all of the small-sized or otherwise unserviceable rock is discarded as waste.

Year by year the borders of quarries are extended and they are worked at greater depth. With lack of available surface area, the presence of heavy overburden, or the difficulties of working at depth, there is a growing tendency toward underground operations. At several lime-plant quarries visited by the writer during the past summer stopes were being driven from the walls of the open pits. This tendency has a direct bearing on the problem of rock waste, for in general the proportion of fines is higher in underground than in open pit work. With a probable increase in underground work there is a corresponding increase in

the necessity for profitable utilization of small sized stone.

Obviously the cost of lime-plant operation could be considerably reduced if outlets could be found for the waste rock. The purpose of this paper is to consider the various ways in which waste may be used.

Many lime-plant operators hesitate to embark on by-product enterprises because the uses, demand, supply and marketing conditions of the new products are unknown to them. Lime is their primary product and they are familiar with its manufacture and sale. Consequently it is very desirable to consider first of all any possible methods by which a larger proportion of the total rock might be converted into lime. With this object in view several lime-plant operators have introduced the rotary kiln like that used to burn Portland cement. As it requires fine-grained material its employment offers a ready means of utilizing stone that might otherwise be wasted. However, the rotary kiln is an expensive type of equipment that would scarcely be justified except in connection with large operations. Also the claim is made that the heat losses are high. It may be assumed, therefore, that the rotary kiln is not yet established as a profitable means of burning lime.

The Mount kiln, a type of continuous shaft kiln, is finding successful use in burning stone in sizes 3 to 5 inches. For large lime plants operating 20 to 24 shaft kilns, the addition of one Mount kiln for small fragments and one rotary kiln for fines is regarded by some as an ideal equipment that will utilize practically the entire quarry output. Such a balanced equipment is highly desirable for it enables the operator to turn practically his entire raw material into lime, a more desirable plan than to manufacture lime together with a series of other products. Small operators cannot, of course, operate such types of kilns, and much of the smaller rock they produce must be wasted or diverted to other uses.

It is probable that with some modification in the construction of the mod-



ern shaft kiln and with a careful grading of the stone according to size, fragments much smaller than 4 inches could be calcined successfully. The Interior Department, Bureau of Mines, is giving consideration to this problem at the present time, but the inquiry is by no means complete. The cooperation of lime manufacturers in conducting experiments of this character is greatly desired and the Bureau stands ready to discuss the problem in detail with any lime manufacturers that are interested.

Fluxing limestone is usually prepared in sizes ranging from 2 to 7 inches. Open-hearth steel furnaces usually demand stone not less than 4 or 5 inches in size, but for blast furnaces smaller stone may be used. Smelting companies that operate their own fluxing quarries may use stone as small as  $\frac{3}{4}$  inch mixed in with the larger sizes, but where purchases are made from independent producers it is unlikely that sizes smaller than 2 inches would be acceptable. Thus 2 to 4 inch stone might be sold to blast furnaces in limited quantities, though a large amount of the small-sized stone would be undesirable when not mixed with the larger sizes. This use is limited not only by the demand but by transportation, for it is too low priced to justify a heavy haulage charge. Most limestone used for lime manufacture is well adapted chemically for fluxing uses, and a number of lime companies sell fluxing stone.

Small sized limestone, or fragments unsuited for lime manufacture are used extensively for road building. In districts where road stone is widely distributed and plentiful, it commands so low a price that lime plants can sell it only in limited quantities in local territory. However, some road-building projects are undertaken in regions where rock is not easily obtainable, and instances have been noted when the necessary supplies of small-sized stone have been purchased at lime plants many miles distant, even involving a combined rail and water haul. It is possible, therefore, through enterprising salesmanship, to develop a wider market for waste as road stone than that which now exists.

For the maintenance of a good road bed a continuous supply of crushed stone is required on railroad lines. Some railroads operate quarries, but most of them purchase the necessary

stone from quarries situated along their lines. With care in preparing a clean stone graded closely in accordance with specifications many operators may build up a steady market for ballast rock.

Large fragments of rock unsuited for lime manufacture may be used for riprap for river or harbor work such as spillways at dams, shore protection or dock construction. Waste fragments are also used to fill in roadways and yards or for rough wall stone. Such applications are of local significance only.

Tremendous quantities of crushed stone are now used for concrete aggregate both in highway construction and in the building industries. Limestone makes a good aggregate and is very widely used. Only those quarries that are within reasonable distance of building operations may take advantage of this outlet, but as with roadstone, aggressive salesmanship may often broaden the market greatly. The manufacture of crushed stone on a large scale is commonly conducted in conjunction with lime manufacture.

Dense compact limestones of attractive color may be crushed into fragments for terrazzo floors. Marbles and certain silicate rocks are used widely in this type of flooring, but there is a demand also for a good quality of limestone.

Limestone chips may be used for facing concrete blocks to give a rock surface effect. Small limestone fragments of good color and reasonably impervious to moisture find some use in stucco and pebble-dash work.

Limestone crushed to the consistence of sand grains may be used as a substitute for sand in mortar and wall plaster. Its superiority over clean sharp silica sand is doubtful, but in regions where natural sand is scarce the substitution of a limestone product may be justified.

Limestone screenings are used with success as fine aggregate in concrete for various purposes. Concrete brick, both common and face brick, are manufactured with limestone screenings as aggregate and are said to give satisfactory service in house construction.

Limestone screenings without a binder are used for station platforms, the loose nature affording good drainage while a firm compact surface is formed by the footsteps of travelers and the wheels of baggage trucks.

Limestone crushed to granular form and screened to uniform sizes may be sold as chicken grit. The term is a general one, for the products included may be graded by size as turkey grit, pigeon grit, etc.

Pulverized limestone is widely used for liming the land. There is some question as to the desirability of using pulverized limestone as a substitute for lime on the land, but where there is a demand for it the lime-plant operator may utilize this outlet for materials that would otherwise be wasted.

The demand for agricultural limestone is seasonal, being confined largely to the spring and fall. In order to overcome the disadvantages of this fluctuating demand it is desirable to have a large storage space so that the pulverized product may be continuously prepared from waste and held in stock for the rust seasons.

Limestone pulverized to a much finer grained form than for agricultural use is finding wide application in various products. Small quantities may be added to stock food as a bone builder. A dust approximately 80 per cent of which will pass a 200-mesh screen is the most widely used filler in road asphalt surface mixtures, though slate flour and portland cement and hydrated lime are used to some extent. Ground limestone is used to a limited extent as a fertilizer filler. It has the advantage over inert fillers in that it has valuable properties as a soil conditioner. Very finely pulverized limestone may be used successfully as a whitening substitute in certain classes of rubber, paint and other products. It is essential for such uses that it be very finely ground and uniformly sized so as to exclude all comparatively large-sized grains. In general a limestone flour that will successfully meet the requirements of fillers of a type like whitening or china clay should approximate 300-mesh size. Few lime-plant quarries have the equipment for grinding or sizing to this degree of fineness, and, therefore, have not been able to utilize this promising field of application.

The Bodega Materials Co., recently incorporated at Aldridge, Illinois, have purchased two crushers of the Allis-Chalmers Co., of St. Louis, Mo. The crushers are of the gyratory type and have a capacity of from 70 to 90 tons an hour.

## Keystone Agstone

### Another Meeting to be Held at State College This Month

At a meeting of the National Agstone Association, Pennsylvania group, held in Pittsburgh, May 7th, two or three new members were secured and it was decided to hold another meeting, June 22nd, at State College, Pa., also including a visit and inspection trip to the farm at State College, on June 21st. This was in accordance with the invitation of President Thomas of State College.

Chairman P. B. Reinhold, of Pittsburgh, suggested that all who intended to attend this meeting, notify the secretary of the association so that suitable arrangements might be made. It was also suggested that the association furnish a speaker for Farmers Day, to be held at State College, June 14th.

The following persons were reported as having been named to serve as directors of the Pennsylvania group: Edw. S. Bixler, Newton, N. J.; J. C. King, Youngstown, Ohio; W. D. Kochersperger, Mifflinburg, Pa.; Ellwood Gilbert, New Castle, Pa.; P. B. Reinhold, Pittsburgh, Pa.

### Lime Company Uses Plenty of Creosote

A firm that is not likely to see the timbering around its operations suffer rapid decay is the Mississippi Lime and Materials Company of Alton, Illinois, whose Hannibal, Missouri, hydrate plant is described in this issue. The management of this company believes in the liberal use of creosote on all wooden structures. In fact, this is one of the maintenance hobbies of Mr. Matthews. All the plants of this company will be found well creosoted and incidentally in a well preserved condition because of this creosoting.

Plans are under consideration to erect a \$4,000,000, cement plant near Exeter, Calif., in the San Joaquin valley. The plant will be open for business inside a year. Mr. John F. Humburg, president of the California Copper Corp., and vice-president of the Engels Copper Mining Corp., will head the cement company.



## Ads on Lime "Ancestry"

### Draw Upon Geological History of Deposit for Publicity

It is not an uncommon practice when giving publicity to a person, to make allusions to his family tree and to characterize him as a worthy scion of an ancient and honorable line. But you never expected to see the lowly limestone that comes out of your quarry and goes into your kiln given publicity on the strength of what we might call, by a figure of speech, its ancestry. Well, the Torrance Lime and Fertilizer Company of Los Angeles, California, has done this steadily and persistently, and, we are given to understand, profitably.

The ancestry of limestone? To express it less figuratively, then, its geological history. That history is an interesting one and the records written in the rocks that furnish the company its lime have in them chapters that are very clear and tell of an earlier life in that section of California that is now known as the Palos Verde Hills, south of Lomita.

Years ago—about 150,000 of 'em—before old King Winter chased the first tourist to California, the south-land was a tropical paradise.

The waters of the Pacific then were warmer, the soil was covered with dense and luxurious vegetation and gigantic prehistoric animals stalked their prey on the seashore.

All this has been told to scientists by oddly-shaped bits of shell and bone found imbedded in the lime quarry of the Torrance Lime and Fertilizer Company in the foothills of Lomita and a half mile from the Palos Verdes estate. A collection of fossils from this property is now on display in the window of the Marine Commercial and Savings Bank, corner of Pine and Broadway. The collection was secured for the local bank through the efforts of The Conner Service, advertising agents.

One tray in the display consists of 13 species of shells, some of which have never been found before except on European shores. Another tray contains a couch shell, which is found along the Florida coast in the West Indies, where the ocean water is much warmer.

A tray of 45 teeth from sharks is nearby. These sharks would have

been maneaters—only it is believed there were no men for them to eat in those days. These triangular teeth are from three-quarters of an inch to two inches in length. From their size zoologists have been able to ascertain that their owners ranged from baby sharks to full grown adults 50 feet in length.

Each shark has 200 teeth in four rows, according to Mr. Purple, general manager of the Torrance Lime and Fertilizer Company. He stated that as each tooth becomes worn, a new one takes its place, so that there is no such thing as a toothless shark. David Starr Jordan of Stanford University, who is declared the most noted authority on water mammals, considers that the shark who "sport" five of the teeth in an adjoining tray must have been about 150 feet long. They are the largest shark's teeth ever found. The largest shark caught now is not over 35 feet long.

The tooth of an Imperial elephant is the largest in the display. This is an odd sized khaki colored object which weighs six and three-quarters pounds and measures eight and a half inches across the chewing surface.

The exact size of the elephant who chewed her cud with this tooth, is unknown, but it is believed that the largest Jumbo of today would be a pigmy in comparison. "The crocodiles will get you if you don't watch out," isn't very often heard in Southern California. Yet these animated leather lizards once roamed the Pacific coast. To prove it, one of them left behind, for the display, the first crocodile tooth ever found west of the Mediterranean.

In one tray vertebrae of land mammals are placed beside a vertebrae of fish. The marine vertebra is hollowed both at the sides and at the top, while the terra firma vertebra is smooth in both dimensions.

Sabre-tooth tigers, with overhanging tusks, also made their home nearby. A tooth of one of them is two and a half inches long as it stands now and is estimated to have been at least five inches long before the tiger got through using it.

Hippopotami also wallowed in Southern California mire. A tusk is a part of the fossil collection as is also a portion of the tusk bone of a mammoth. There is a lion's bone also and several bones of a prehistoric five-toed horse.









General View of New Hydrate Plant of Mississippi Lime & Material Co. at Hannibal, Mo.

## Modern Missouri Hydrate Plant

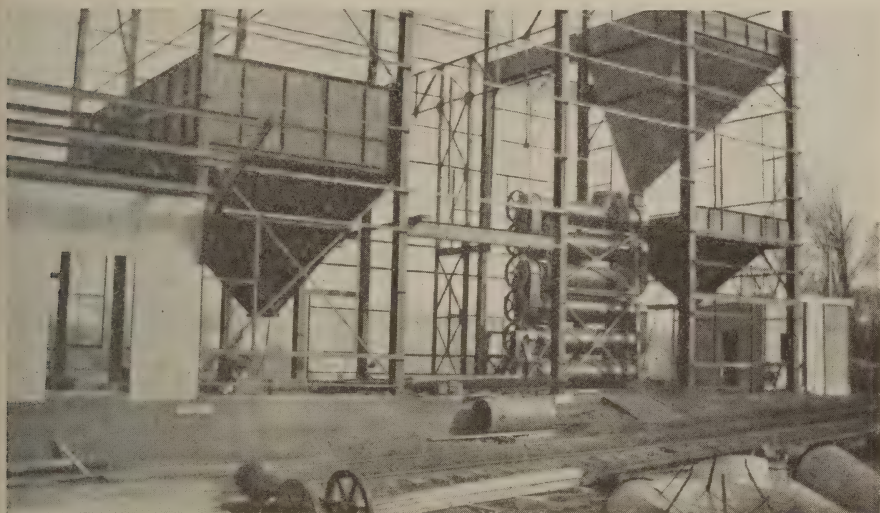
Hannibal, Missouri, is soon to have a lime operation of the most modern kind. This new plant, to be operated by the Mississippi Lime and Materials Company, under the name of the Bluff City Lime Company, has just been finished on the hydrate end and will operate until late in the season with burning facilities that have been in use for some time, and which will be replaced this fall by newer methods that will measure up to the character of the hydrate plant.

The construction of the plant is representative of the trend of thought among lime producers on the subject of fire-proof buildings. The structure that the Bluff City Lime Company has put up will reduce the fire hazard to a purely hypothetical quantity. No wood at all is used in construction work. Structural steel, sheeted over with heavy corrugated galvanized siding, is used in the construction of the building and leaves no opportunity for fire to get in its destructive work. This is the first feature of the plant that one notices. There are plenty of other features equally interesting.

Lime has been burned for many years at the location of the present Bluff City plant, and the kilns now in use are those employed in earlier operations, as already stated. These kilns are soon to be replaced by more modern and efficient equipment. Work along these lines will begin in the fall and will be finished, if the company's expectations are realized, in time for the spring operations. Right now the old plant is serving the useful purpose of producing lime for the new hydrate plant, which is the subject of this article.

The city of Hannibal, one of the leading lime producing centers of Missouri is given its importance by the fact that large quantities of Burlington limestone are exposed a short distance from the city and that the city itself has very good transportation facilities, including the Chicago, Burlington & Quincy and the St. Louis and Hannibal railroads, together with the Mississippi river. Located close to the city itself are many good markets for lime products. All these advantages, the deposits, the markets, and the trans-





A Progress View, Showing Structural Features of the Plant

portation facilities, unite to make Hannibal an important factor in the lime production activities of this section of the country.

The greater part of Marion County, in which Hannibal is located, is underlaid with Burlington limestone which has a maximum thickness of 150 feet and consists of coarsely crystalline limestone, brown to grey in color, fossiliferous, and containing rounded nodules and layers of white chert. This chert sometimes runs as high as one-fourth of the mass in the higher part of the formation, where much of the limestone is buff color and has a high magnesium content on the lower part. The 40 feet of limestone lowest in the stratum runs from light grey to white, and has a very small chert content. It is this particular stone that is valuable to the lime producer and that is used by him to the exclusion of the other material, which is very satisfactory as a crushed stone.

The limestone used for burning is very free from impurities. Calcium carbonate content runs from 90 to 99½ per cent. In the case of the Bluff City Lime Company, quarry stone that is taken out usually has a calcium carbonate content that is closer to the latter figure.

Quarrying at the Bluff City plant is against an escarpment with 8 or 9 feet of loess stripping. The quarry face contains, not far from the top, a bed

of buff limestone that has in it a high percentage of iron and is somewhat magnesian in character. Its distinctive color distinguishes it readily from the more valuable limestone intended for burning, and which is found at a lower level, as described.

Beneath the Burlington formation is a ledge of Chouteau limestone that runs in thickness up to 40 feet. The upper portion of this limestone is heavily bedded and is bluish-grey to drab in color, an impure dolomite containing occasional chert nodules. The lower portion is of grey limestone, fine grained and thinly bedded with a calcium carbonate content of 90 to 95 per cent. The lower portion is sufficiently pure to be used in the manufacture of lime, but cannot be quarried economically.

At the quarry a certain amount of excavating has been accomplished by tunneling and this method will be used more freely in the future. Stripping and the depth of undesirable stone have become so heavy in places that it is only by tunneling that this stone can be secured with economy.

When lump lime arrives at the new hydrate plant from the kilns, it is dropped first to a No. 816 Sturtevant crusher as shown by the sketches. This crusher is located below floor level. The bottom of the pit in which it is located is 7 feet below the floor to which it is connected by stairs. In

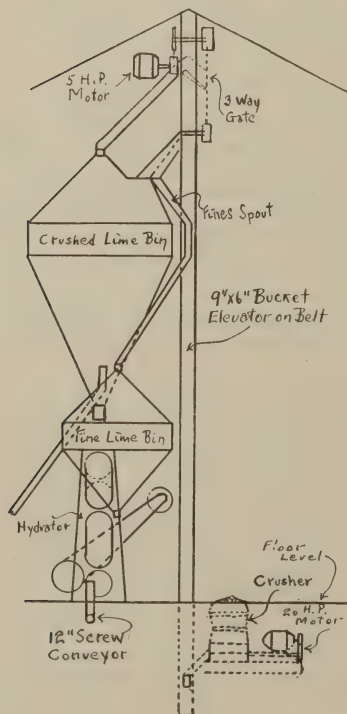
this pit is located also a 20 horse-power motor that drives the crusher. This power unit is directly connected to the crusher. This crusher serves the purpose of reducing material to sizes proper for handling throughout the process. No provision is made for spouting back materials to this machine for recrushing. Its entire product which, at a crusher speed of 250 r.p.m., amounts from 8 to 16 tons per hour, passes to a 9x6 inch bucket elevator that has a capacity of 16 tons per hour. This elevator, 57 feet between centers, runs from a point below the spout of the crusher to the top of the building, from which it discharges by spouts to a Newaygo screen, belt-driven by a loose pulley connected to the elevator. This screen and elevator are driven by a 5 horse-power General Electric motor.

From there the lime is spouted to a crushed lime bin or a fine lime bin, both of which bins are located below the screen and alongside the elevator. The crushed lime bin has a capacity of 50 tons, and the fine lime bin a capacity of 15 tons. At the bottom of

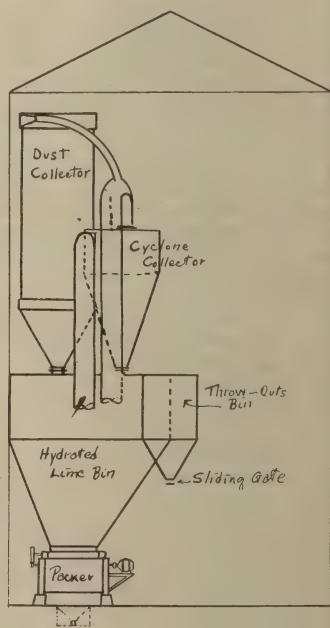
each of these bins is a sliding gate through which material is taken off.

The bottom of the crushed lime bin, containing a sliding gate, is located directly at the intake of a Kritzer 6-cylinder continuous hydrator. The crushed lime introduced into the top of the cylinder of this device is passed gradually by the rotation of the cylinders to lower and lower levels until it is taken off at the bottom as scientifically hydrated lime. At the time that lime is fed into the top cylinder water is poured in at the same point, the amount of water and lime being accurately controlled. Through each cylinder extends a shaft on which is mounted a number of paddles, rotated by gears outside the cylinders. The function of the paddles is to propel the lime and water through the series of cylinders, carrying these materials the length of each cylinder and dropping from one into the next, the material at each drop reversing the direction in which it is flowing.

After the lime has been passed through the hydrator and is reduced to the soft fluffy condition of hydrated

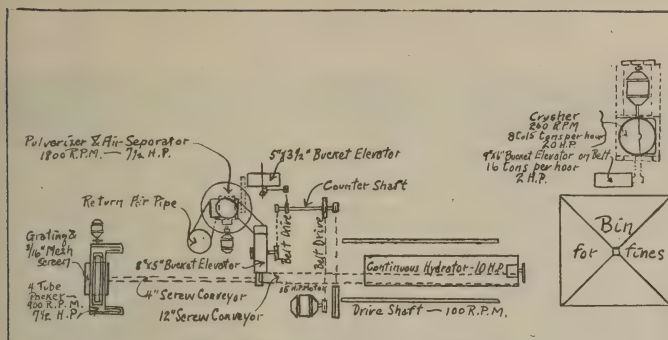


Left—  
Section at Re-  
ceiving End of  
Plant

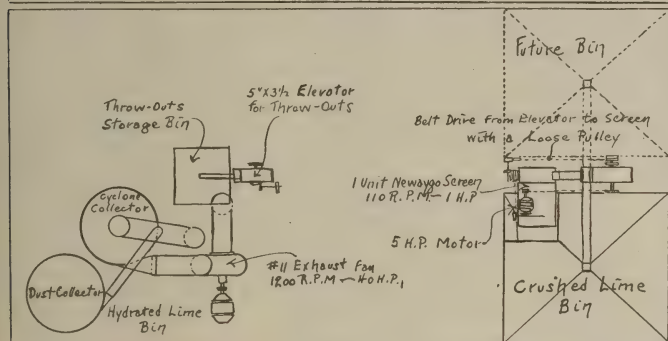


Right—  
Section at  
Packing End of  
Plant

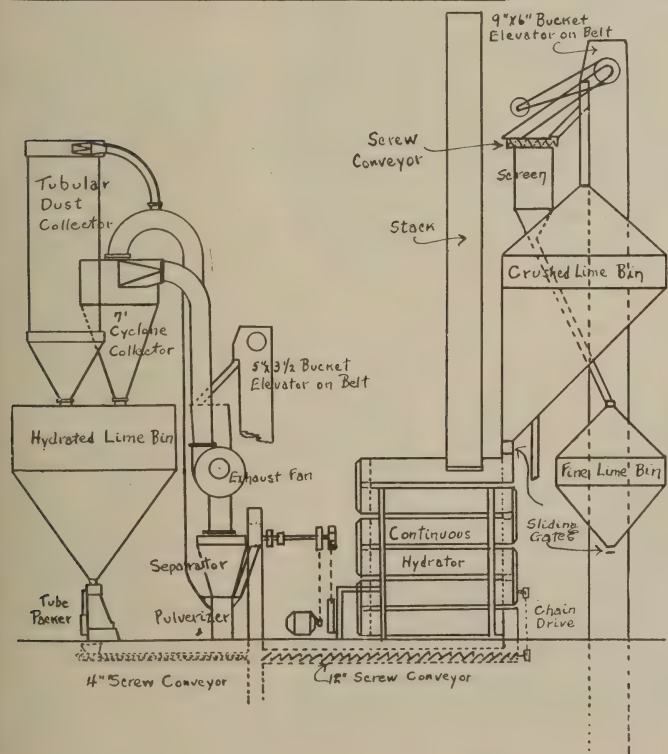




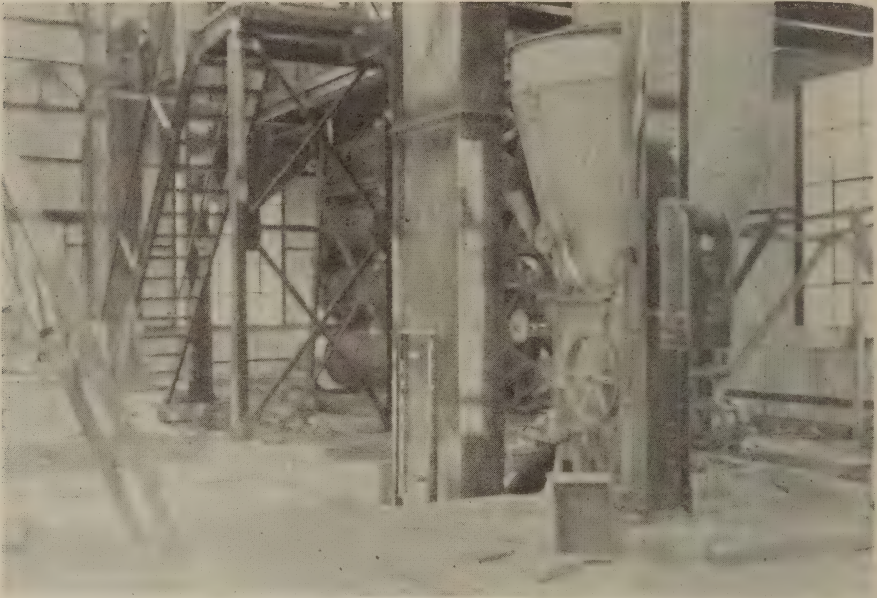
Ground Plan of  
Hannibal Plant  
of Mississippi  
Line and  
Material Co.



Section at Top  
of Crushed  
Lime Bin



Side Elevation,  
Illustrating  
Flow of  
Materials



Interior View, Showing Relative Locations of Feed Bin, Hydrator and Pulverizer

lime, it is dropped from the last cylinder to a point a few feet below the floor level, at which point it is picked up by a 12 inch screw conveyor which discharges at an 8x5 inch bucket elevator, operating vertically from a belt. This elevator raises the material a distance of about 15 feet and deposits it at the pulverizer. The hydrator and elevator are operated through a line shaft from a 15 horsepower motor. The 12 inch screw conveyor running underneath the floor and below and parallel with the hydrator is operated by a chain drive from a sprocket on the second cylinder of the hydrator, from the bottom. The hydrator requires 10 horsepower of the 15 that the motor develops. The other 5 are utilized in the running of the 12 inch screw conveyor and the elevator. The conveyor and elevator are products of the Stephens-Adamson Company of Aurora, Illinois, as are also several pieces of similar equipment throughout the plant.

The elevator just referred to discharges at a Raymond mill, which reduces the hydrated lime to the requisite fineness and allows it to be taken up by an exhaust fan to a cyclone collector and to a tubular collector and, by means of a 5x3½ inch

belt conveyor running vertically on a belt, to the throw-out bin. The tubular dust collector and the cyclone collector discharge into the hydrated lime bin above a four tube packer made by the Valve Bag Company of America.

Here the hydrated material is run into bags in a manner that is familiar to all lime producers. Material that runs through the packer past the point at which bagging is done drops through the floor into a 4 inch screw conveyor running in a tunnel which is a projection of the 12 inch screw conveyor that carries hydrated lime from the hydrator.

The building which houses this operation is 60 feet long, 30 feet wide and 54 feet high in the section where the machinery above described is located. In back of this section 60 feet long is another section of equal length. This latter is used for storing and shipping bagged hydrate. Loading tracks are run alongside the building and material is conveniently loaded into cars.

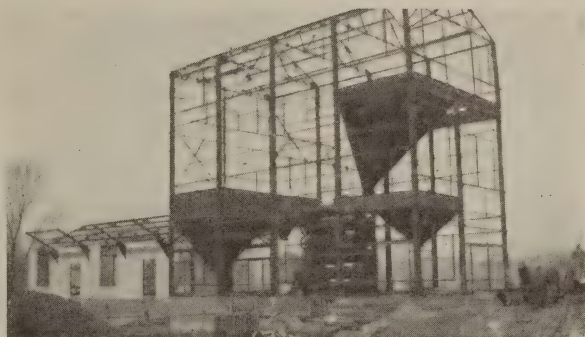
The steel buildings were erected for the company by the Mississippi Valley Structural Steel Company of St. Louis, Mo. This concern, which is handling the erection of many steel structures



in the Middle West, had the job of placing the machinery and of fabricating and putting together the structural materials, including the heavy galvanized iron sheeting. Fabrication of the structural materials was done at Decatur Illinois.

The building is entirely fire proof and constructed in accordance with the increasing sentiment in the lime business towards the building of plants that are immune from the destructive action of the fires that, in this particular industry, are so easily and frequently started. At the time of the writer's visit, the only woodwork that could be observed around the plant were the steps in the stairs leading to various levels to which access has to be provided for the operation of the plant. This plant is one of a number recently erected that show how producers have determined to defeat their ancient enemy.

The improved calcining equipment that will be added to the Bluff City operation this fall, will be of the most modern kind. Already a considerable amount of the old equipment has been replaced by a modern crushing and screening plant that furnishes a considerable amount of material for ballasting and for use as concrete aggregate. Four square kilns are in use for the burning of the lime with which the hydrate plant just described will operate. In the fall, the burning facilities will be made to include 4 steel shaft kilns of



Giving an Idea of Bin Construction and Capacity



Another View of Plant in Process of Construction.



The Earliest Picture of the Plant, Showing Kritzer Hydrator in Place



Loading Track at Side of Plant. Low Section of Building in Foreground is Warehouse

modern design, and installed and equipped with the idea of producing the highest quality of lime with distinct economy.

Quarrying facilities will also be improved so that the operation of securing stone will compare favorably in cost and general convenience with the new calcining and hydrating plant.

Operations at Hannibal are in charge of Mr. A. H. Hastings, superintendent, who was formerly located at the company's plant at Alton, Illinois. Mr. Hastings has been connected with lime production for quite some time and thoroughly understands his business.

The plant at Hannibal had been operated by a number of owners before it was acquired a few years ago by the Mississippi Lime and Material Company. This concern, a member of the National Lime Association, is a live one. Association members are well acquainted with Mr. Aldous and Mr. Mathews.

Quarry operations are beginning again at Nicholson, Pa., which up till twenty years ago was the center of a thriving industry of this kind.

The Gifford-Wood Company of Hudson, N. Y., are changing the location of their Buffalo, N. Y. office to Pittsburgh, Pa. Since May 1st they have been located in the Peoples Bank Bldg., on the corner of Fourth Avenue and Wood Street. This move was decided on in order to give better service to their customers.

The St. Charles Sand and Material Co., of St. Charles, Mo., has been incorporated with a capital of \$25,000. This new company has bought out the firm of Blaske, Carter and Day Sand & Material Co. and Mr. Blaske has gone in with the new concern as president. Other officers are, Mr. J. C. Willbrand, vice-president; and R. Summa secretary and treasurer.

The Bluffton-Lewisburg Stone Company, 406 Opera House Block, Lima, Ohio, announce that they have purchased the Hancock Stone Company at Findlay, Ohio, located on the T. & O. C., B. & O., L. E. & W., and Big Four Railroads. With the addition of this plant, located as it is, the Bluffton-Lewisburg Stone Company expects to serve the requirements of the trade even better than heretofore.



# Exercise of Judgment in Choice of Quarry Equipment

By OLIVER BOWLES

## Choice of Equipment Controlled by Conditions

Much has been written on the efficiency of methods and equipment used in rock quarries; some are highly recommended, others are condemned as wasteful or inadequate. A note of warning should be sounded, however, on the danger of applying generalities too promiscuously to individual cases, for conditions may not always justify the use of the most approved methods. First judgment of an observer at some quarries might condemn the methods employed, while an opinion based on a more mature understanding of controlling conditions might support the seemingly inefficient method. Actual working conditions constitute the basis on which the choice of all methods and equipment must find their logical support.

## A Well Balanced Equipment Desirable

A lack of proper balance between the various elements that make up the total quarry equipment is a common mistake. The widely published accomplishments of a steam shovel may influence an operator to change from hand loading to steam shovel methods, and in many such instances the small crusher mouth, which was quite satisfactory for hand loaded rock, so retarded the flow of larger fragments that the advantages of a large loading shovel were practically annulled.

Again, transportation may be the weak link in the chain, for a shortage of cars will delay all operations. At one quarry observed by the writer only six cars were available to transport rock from steam shovel to crusher. Even a brief delay at the crusher resulted in suspension of loading. Also there was no reserve of loaded cars to provide for continuous plant operation during the inevitable delays of track moving and blasting. For the best service each branch of the equipment should harmonize in capacity with all other branches, for money is lost if machines are either over-worked, or are kept long in idleness.

## Plant Capacity in Relation to Output

The nature and extent of the equipment should harmonize with the volume of output desired. A plant with a capacity too small for a required output, if operated under strict supervision, may be kept in good working condition for considerable periods of time, but sooner or later the necessity for major repairs will require the temporary shut down of some units with consequent loss of production. It is usually desirable to maintain equipment somewhat in excess of the necessary capacity, as machines are more easily kept in repair when they are not over-worked. Also a small excess capacity permits a ready expansion of business.

On the other hand equipment greatly in excess of that required for proposed production is not economical. The maintenance and repair charge may be low, but the operating expense of over-size machinery is usually high. Also a heavy investment means low dividends from a limited output. A serious mistake is commonly made in investing too heavily in a plant for a new enterprise, without a proper estimate of the probable returns on such investment. The modern tendency in industry, a tendency demanded of the times, is to operate plants with mechanical labor-saving equipment, but conservation should rule in gaging the size of the plant. Unless there is convincing prospect of a rapid expansion in the industry it is wise to gage plant capacity in moderate excess of first needs, and if possible to construct the plant on a unit basis, thus providing for future expansion by the erection of additional units. Operators have been known to so paralyze their resources, and restrict their working capital through over plant investment that bankruptcy has resulted.

## III-Advised Changes in Practice

It is well for lime plant operators to keep strictly in mind that what is commonly regarded as the most efficient method may, under some circumstances, be the least efficient. Thus

the lime plant quarry operator may be so influenced by the fact that under modern wage conditions the hand loading of rock is in general more costly than steam shovel loading, that he will introduce the power shovel in his quarry. Stone for lime manufacture must, however, be sorted as to size, and sometimes as to quality, operations which the hand loader may perform while loading. The steam shovel may load at low cost, but it cannot sort its materials, and the addition of sizing equipment becomes a necessity. Thus the abandonment of hand-loading methods may involve such a heavy equipment expense that the net result may be actual loss. The mechanical handling of stone is most likely to give unsatisfactory results where employed in small quarries, for in many large plants mechanical means are employed profitably. Usually mechanical loading and sizing cannot be accomplished advantageously on a small scale, and therefore the daily output is an important factor to be taken into account in considering any proposed change in equipment.

#### Patchwork Equipment

In the attempt to introduce more modern machines some parts of a plant may be replaced by new and entirely different equipment while other parts remain unchanged. The results are often very unsatisfactory, for the new equipment may not properly fit in with the old. A common mistake of this character is the attempt to load rock with steam shovels into cars adapted for hand loading. The latter are usually too small for effective steam shovel work, but their greatest fault is insufficient strength to withstand the rough treatment of steam shovel loading. Thus while the operator may save the expense of purchasing new cars, the repair charges are likely to be excessive. Sometimes weak cars are reinforced to meet the more strenuous requirements, but the remodelling of old cars to adapt them to new uses is often unsatisfactory, and may be more expensive in the end than the purchase of new cars.

Similar lack of harmony has been noted in cement plants where attempts have been made to change from a dry to a wet method with as little modification as possible in plant design. Thus larger kilns may be in-

stalled while the same grinding and mixing equipment is retained. The raw materials are ground dry, mixed in a dry state, after which water is added and the mixture burned in slurry form. Whatever advantages might be gained by grinding wet, and mixing in slurry tanks, are lost and at the same time additional heat is required to drive off the water. Thus through partial adjustment the plant possesses the disadvantages of both methods, and gains little or none of the advantage that might result from a properly designed wet-burning plant. While the above is not a quarry problem it illustrates the ill-effects of a patchwork equipment.

It is evident therefore that in planning any decided changes in equipment careful consideration should be given to the necessary modifications in other machines that form necessary links in a complete and well-designed plant.

### Limestone As a Constituent Of Explosives

Limestone, more or less pure, is used in many types of blasting explosives, as it acts an antacid, state C. A. Taylor and William H. Rinkensbach, assistant explosives chemists, of the Department of the Interior, in Bulletin 219, recently issued by the Bureau of Mines. The form in which it is used ranges from a rather pure calcium carbonate to marble dust containing as much magnesium as calcium. Generally it is used as the only antacid, but sometimes with another antacid, such as zinc oxide. The average dynamite contains less than 1.5 per cent of calcium carbonate, but special powders have contained as high as 15 per cent. The impurities in limestone are of no practical importance in the manufacture of explosives.

Fire almost completely destroyed the plant of the Crystal Carbonate Lime Company at Elsberry, Mo., doing a damage estimated at \$60,000. The origin of the fire was not determined.

Announcement has been made that the Marquette Cement Manufacturing Co., of Chicago, has purchased the Cape Girardeau Portland Cement Company, at the reported price of \$2,000,000.





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# PLYMOUTH

## *Gasoline Locomotives*



## Plymouth Locomotives Help Cappelen Memorial Bridge

The Cappelen Memorial Bridge, Minneapolis, is over 1,000 feet in length. The bridge is 400 feet in length, and is the longest concrete arch ever constructed in bridge building. The bridge contains 32,000 yards of concrete, 900 tons of reinforced steel and 100,000 feet of lumber. City Engineer Elsberg states: "The use of PLYMOUTH Gasoline Locomotives in the concrete mixing plant has worked out very efficiently and economically."

*Write for Catalogue and Performance View*

**THE FATE-ROOT-HEATH CO.**

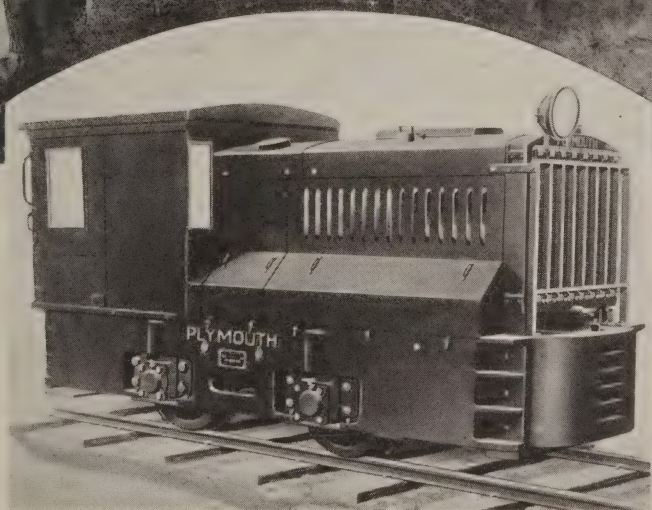




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Above—Breaking Yard where Marble from Quarry Is Reduced to Kiln Size.

At Right—Top of Kilns, Showing Arrangement for Charging.



Marble Quarry from which is Secured the Broken Marble on Which Plant Operates.







Burning and Hydrate Plant of Williams Lime Manufacturing Company.

## Fireproof Lime Plant Burns Marble Secured without Quarrying

When the Williams Lime Manufacturing Company of Knoxville, Tennessee, decided to build a new lime plant, they decided at the same time to build a lime plant of the most modern description, so designed as to give efficient and economical production, and so constructed as to require little upkeep cost and to effect a great reduction in the fire hazard that is ever present in plants built of combustible material. The pages of PIT AND QUARRY have in the past year recorded instance after instance of plant fires brought about by the heat of the kilns, by sparks or, in confined spaces, by spontaneous combustion. The Williams Company took the best course out. They put up a structure made entirely of steel, durable, more openly arranged than a wooden structure, and with no fire hazard.

The Williams Lime Manufacturing Company's new plant is the latest of a considerable group of lime plants around Knoxville. Spoiled marble from the many marble quarries of the section makes available a good supply of lime material, procurable at low cost, and makes possible the production of very fine lime. The plants oper-

ating from material secured from the waste piles of marble quarries have a material on which a large part of the work of quarrying has already been accomplished, and which requires in most cases but further reduction to proper and convenient size and transportation to kilns. In this section also is located the plant of an officer and well-known member of the National Lime Association, Mr. Milton McDermott of the Knoxville Sand and Transportation Company. Mr. McDermott's plant is at the present time also in process of change, and will in a short time be operating with increased efficiency and greater output.

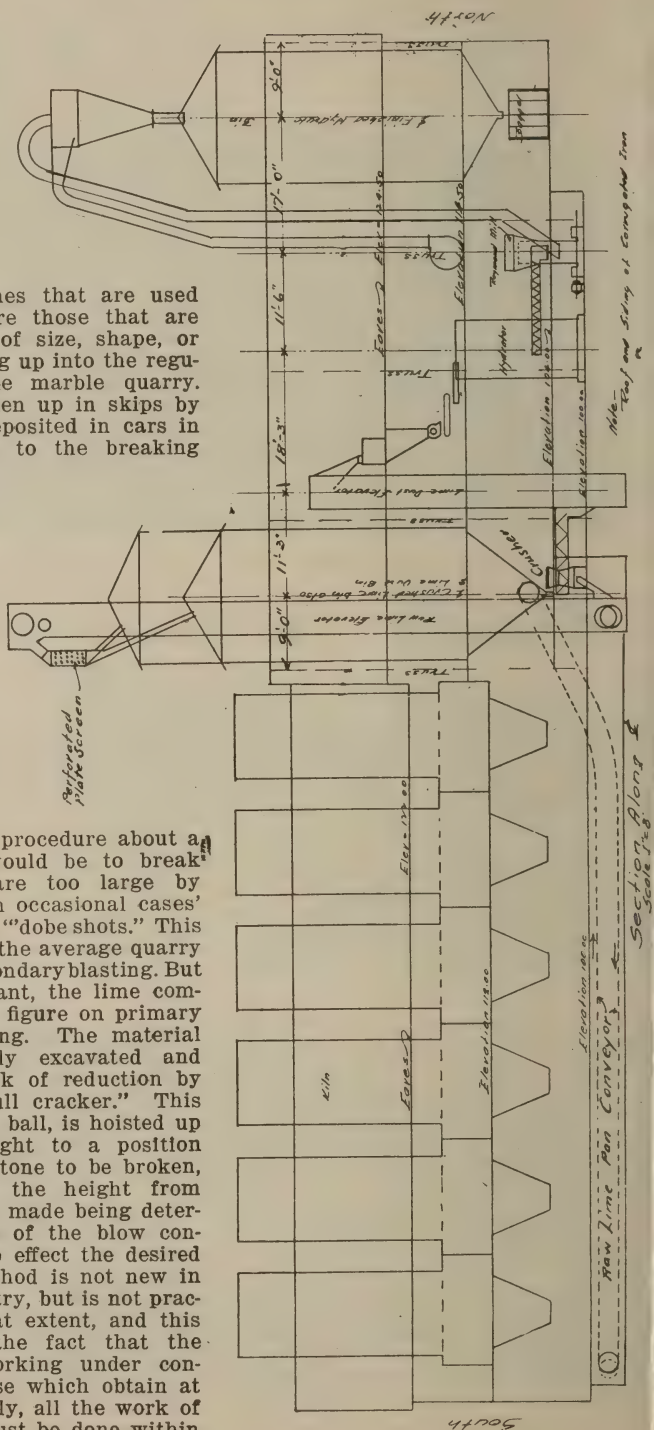
The plant was designed by Sehorn and Kennedy, engineers, of Knoxville, and construction was supervised by them. Mr. E. A. Sehorn, a member of the firm, was particularly active throughout the progress of the work. Mr. Eberhardt of the Schaffer Engineering and Equipment Co. of Pittsburgh, was associated with Mr. Sehorn.

Close to the plant of the Williams Lime Manufacturing Company is the marble quarry shown in a number of the accompanying views. As can be seen from a study of the views, the

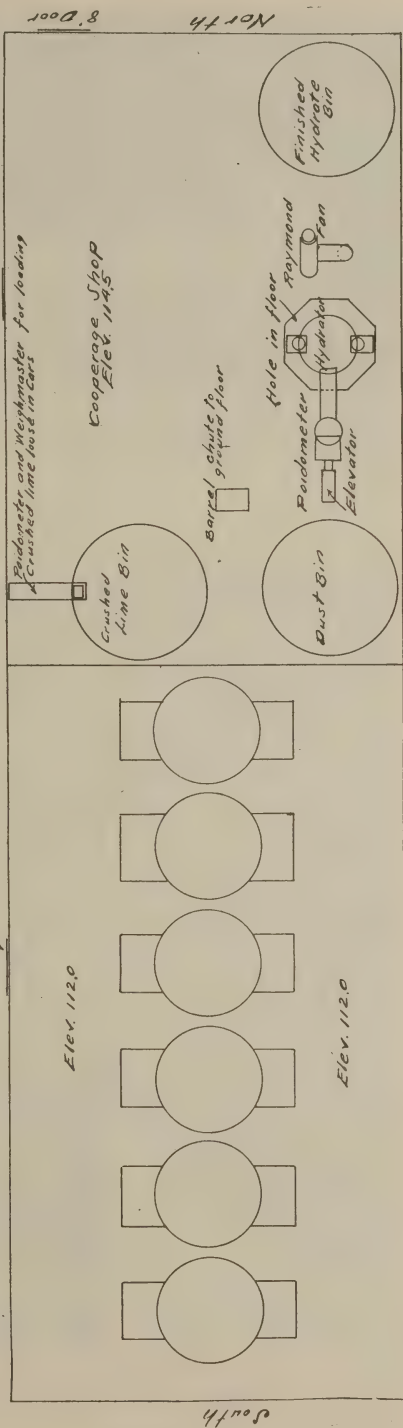
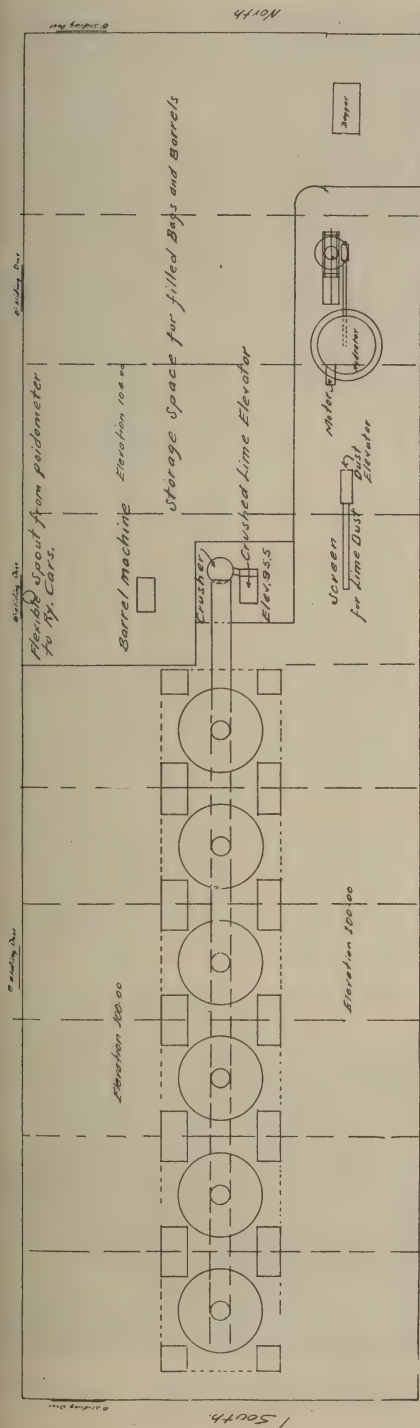
quarrying process here necessarily results in the production of a considerable amount of waste; in fact, there is in sight for the lime plant at the present time, a supply of lime material sufficient for a number of years' operations. The stones that are used for lime making are those that are unsuitable because of size, shape, or condition, for making up into the regular products of the marble quarry.

This waste is taken up in skips by the derricks and deposited in cars in which it is hauled to the breaking yard. The stone is mostly of too large size for feeding into the kilns and is brought down to correct proportions in the breaking yard.

The breaking operation is interesting to the average quarryman, in that no explosives are used for reduction of the stone to handling size. The ordinary procedure about a limestone quarry would be to break down stones that are too large by "block holing" or, in occasional cases, by "mud capping" or "dobe shots." This would constitute at the average quarry the operation of secondary blasting. But at the Knoxville plant, the lime company has neither to figure on primary or secondary blasting. The material is delivered already excavated and they finish the work of reduction by the use of the "skull cracker." This device, a heavy iron ball, is hoisted up by a derrick, brought to a position directly above the stone to be broken, and then released, the height from which the release is made being determined by the force of the blow considered necessary to effect the desired reduction. The method is not new in the quarrying industry, but is not practiced to a very great extent, and this often because of the fact that the operator is not working under conditions such as those which obtain at this plant. Obviously, all the work of the skull cracker must be done within









Top of Hydrator, Stacks and Poidometer. Mr. Harold Williams, Sec'y and Treas., in Background.

a distinctly limited area. This means that the stone must be conveyed to one particular point, unloaded, cracked, and reloaded for putting through the plant process. A close study would undoubtedly show economies in the method under the proper conditions. These conditions are observed at the Williams plant.

It will be noted that the derrick is a piece of equipment used more at this operation than at most. Here again the conditions peculiar to the operation make its use more economical than it would be in other cases.

After the breaking operation is accomplished, stone is loaded into side dump cars and conveyed a short distance to the tops of the kilns. It will be seen from a study of the general plant view that proper advantage is taken of the force of gravity. Materials do not have to be elevated to the tops of the kilns—that is, aside from what elevation is done in raising them originally from the quarry, and in the loading and unloading processes incidental to the breaking action.

The accompanying views show the method of charging kilns. At the top of each kiln is hopper space sufficient to keep a good supply of stone ahead of the burning operation at all times.

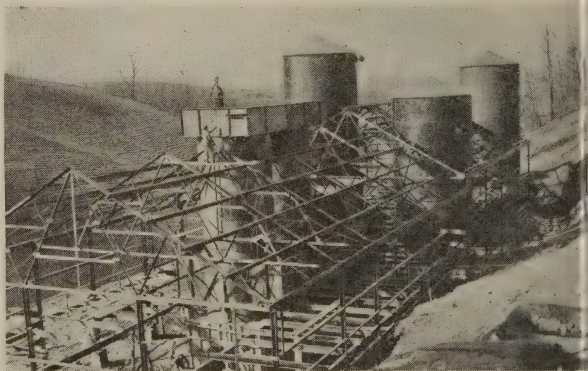
The plant has been

built to operate with 6 kilns, but all of these have not been put in up to the present time. It was the original intention of the company to install 3 of these 6 kilns, but this decision has been changed to include 4 kilns, giving thus two-thirds of the capacity for which the plant was originally built. Additional kilns will be put in later, nearer to the receiving end of the building. This means it will be unnecessary to make any changes in the plant outside of cutting

openings for the new kiln equipment. A pan conveyor, which carries raw lime to the finishing department has been built up to a point where its operation will include the two kilns that will later be installed.

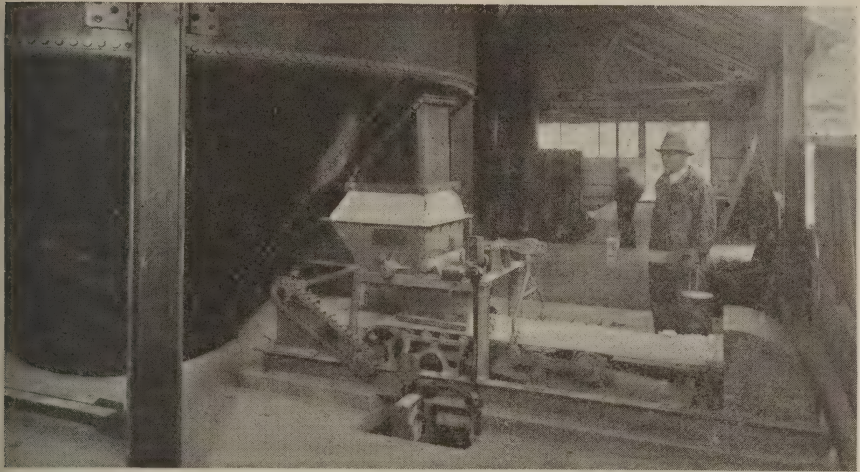
The kilns, 11 feet in diameter and measuring 38 feet from the top of the hopper to the bottom of the shears, are products of the Arnold & Weigel Company of Woodville, Ohio. They are equipped with furnaces on two sides and with the firing floor conveniently arranged. Burning is done entirely by coal. This firing floor extends some 85 feet from the receiving end of the building to the end of the burning department and is a few feet lower than the level of the floor of the finishing department.

After the lime has been taken from the cooling cone of the kiln and



Progress View Taken in Last Week of February, Showing Method of Construction.



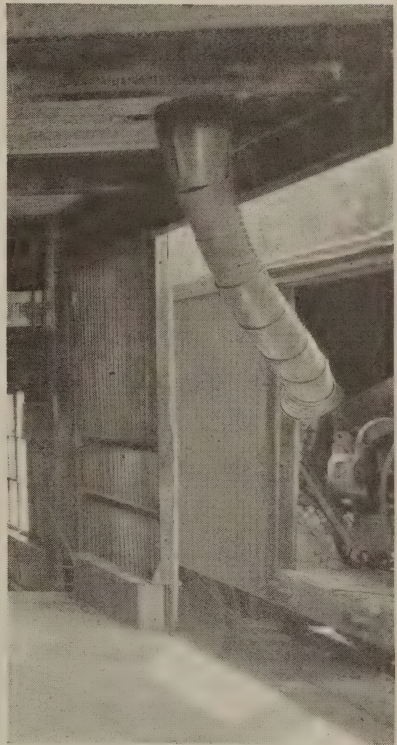


Special Schaffer Poidometer Weighing Crushed Lime for Bulk Car Shipment. Mr. E. A. Sehorn in Back of Poidometer.

dropped on the lime house floor, the lime house men shovel or scoop the raw material through openings in steel plates which cover the entire length of the conveyor pit. During the process of loading lime into this conveyor, the men reject any overburns, cores or foreign material which may occur in the lime. This, by the way, is the only time in its course through the plant that the lime is handled by hand.

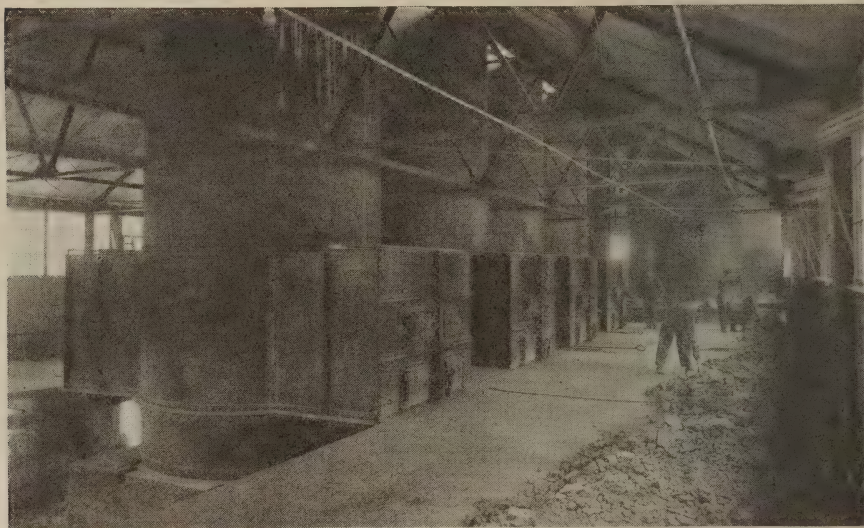
The raw lime pan conveyor, manufactured by the Jeffrey Manufacturing Company of Columbus, Ohio, runs the full length of the lime house and beyond into the finishing plant, running 10 feet higher at the discharge end. The steel plates over the entire length of the conveyor pit are removable, making it possible to shovel the lime into the conveyor at any point.

This pan delivers to a Sturtevant crusher which reduces the material to  $1\frac{1}{2}$  inch and under. The crusher, mounted at floor level, spouts its product to a vertical bucket elevator, 70 feet between centers. This elevator conveys the raw lime to the highest point in the plant. The discharge of this elevator is in a small house located above the main structure, in which house is a stationary plate screen with  $\frac{1}{8}$  inch perforations. Lime passing over the screen goes to the crushed lime storage tank; lime passing through the screen openings goes to the dust storage bin. Delivery



Flexible Spout and Barber-Greene Loader Fed by Poidometer Above

from the screens to the bins is entirely by gravity.



Firing Floor, Showing One Side of Furnaces of Battery of Four Arnold and Weige  
Kilns

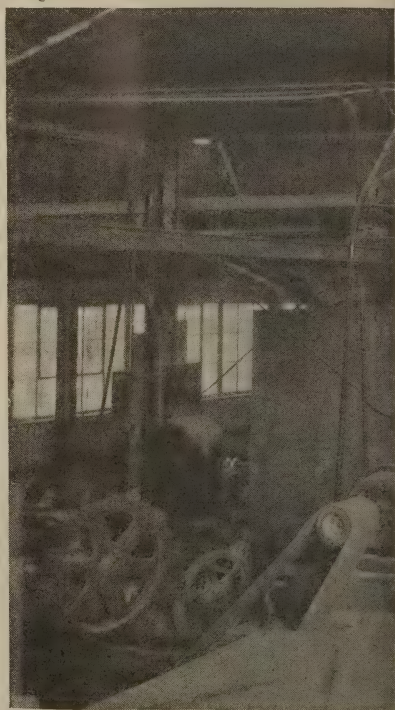
The purpose of the lime dust bin is to serve as a source of supply for the hydrating department. Material is drawn off from this bin by a screw conveyor and delivered to a 38-foot lift vertical elevator. This vertical elevator deposits the lime dust in a flood hopper above a poidometer manufactured by the Schaeffer Engineering and Equipment Co.

The purpose of the poidometer is to regulate the flow of lime dust and water into the Schaeffer hydrator. Exact proportions of lime and water are fed into the hydrator and pass through successive stages of this piece of equipment to the bottom, where thoroughly hydrated lime is drawn off by a screw conveyor and passed to a Raymond mill.

After reduction to the necessary fineness, the material is taken from the Raymond mill and passed to the finished hydrate bin. Underneath this hydrate bin is a 4-tube Bates packer.

Crushed lime may be taken from the bottom of the bin and loaded into barrels through a Howes barrel packer or may be loaded into cars by a Barber-Greene box car loader fed by a flexible spout. The method of weighing the lime that goes into the cars is through a Schaeffer poidometer, as shown.

With this poidometer, which has a weighmaster attachment, the company



Head End of Steel Pan Conveyor  
loads crushed lime loose in cars. B  
so weighing the bulk shipments, th

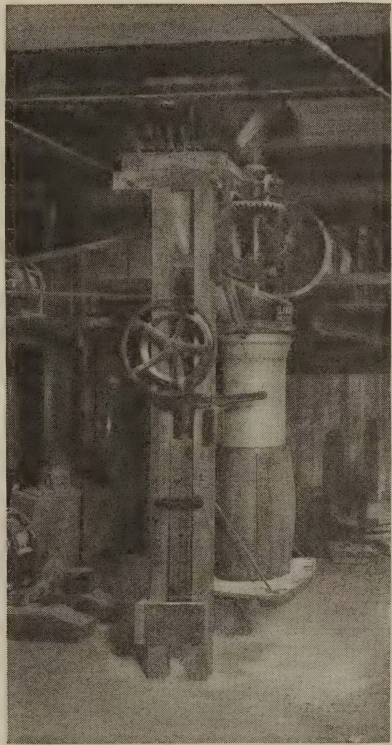


expense and upkeep of a railway track scale is saved.

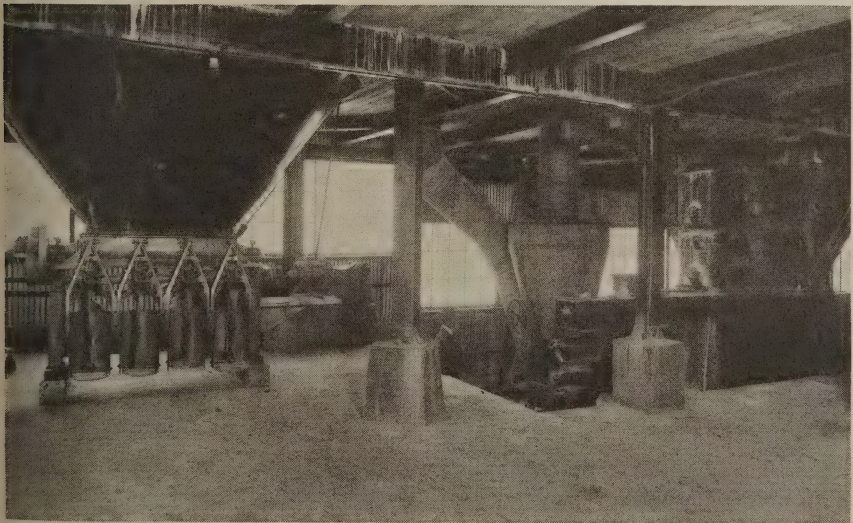
All machines throughout the plant are equipped with individual motors. These motors are products of the General Electric Company and have automatic stop and start switches that are actuated by the flooding or by the lack of material.

The steel buildings were erected by the Converse Bridge and Steel Company of Chattanooga. Walsh and Weidner of Chattanooga furnished the storage tanks. The elevators and pan conveyors were furnished by the Jeffrey Manufacturing Company of Columbus, Ohio, and the derricks by the American Hoist and Derrick Company of St. Paul, Minnesota.

Most lime plant operators will see unusual features in this plant of the Williams Lime Manufacturing Co. The method of securing material is, of course, dependent upon purely local conditions and differs greatly from the methods in vogue around the average operation. Probably the use of the skull cracker will give a few operators something to think about. The method cannot, of course, be applied with any degree of economy to the usual lime operation but there might be room for such a system around a few plants where conditions approximate those at the Williams Lime Manufacturing Co.



Howes Barrel Packer, Fed from Crushed Lime Bin Above



Bates Packer, Raymond Mill and Schaffer Hydrator. Mr. Eberhardt of Schaffer Company Standing Beside Mill

## Lime Spoil Reclaimed

### Masses of Waste Converted into Agricultural Lime

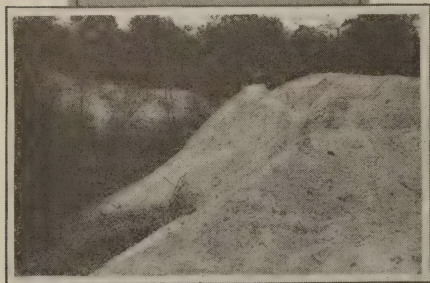
An unusual lime development is that of the Utica Lime Company, whose office is at Seymour, Indiana, but whose plant is located at Utica on the Ohio River, a short distance east of Jeffersonville. This plant is located at one of the largest and best deposits of limestone in the locality and has three or four old kilns, built into the bluff, which did good service for a long time, but which have not been used for several years.

The men who burned lime at this plant were working before the time of the general use of hydrated lime, producing lump lime for the general material market. The lump lime was carefully hand picked, leaving considerable percentage of fine material which was thrown onto a spoil bank. In the course of years, this accumulated until now there are now many thousands of tons of this material piled up around the plant.

It just happens that the soil of this part of Indiana can use to advantage almost unlimited quantities of lime for the correction of acidity, so the present company, of which Mr. C. R. Jackson of Seymour, Indiana, is the active manager, is reclaiming this material and converting it into agricultural lime.

This is not so simple an operation as it would appear, because of the fact that while the spoil banks have carbonated over the outside, this carbonation extends only for a few inches, below which the material is soft lime putty.

The process of operation is as follows: The lime is shoveled into cars, each containing  $1\frac{1}{2}$  tons of material, taken up an incline by a steam hoist, dumped into a bin, which feeds into a scraper conveyor, and this dumps the material into a rotary dryer, which revolves at the rate of two times per minute. This thoroughly dries the material, tests showing that 30 to 40 per cent by weight of this is removed as moisture. From the dryer the material is passed to a Day pulverizer which reduces it so that 95 per cent will pass through a screen of 10-mesh, and at least 40 per cent will pass a 100-mesh screen. From the pulverizer







More views of the Operation of the Utica Lime Company, at Utica, Indiana.

the material is elevated to a large bin, from which it is packed into 100-pound burlap bags.

Much of this material is shipped on the river in barges, and some is hauled to the railroad in large trucks. The company has been successful in marketing a good tonnage this season, but has had considerable difficulty in obtaining cars.

Chemical analysis of the material shows that it contains 25 to 40 per cent calcium hydroxide, the remainder being calcium carbonate. Utica agricultural lime gives quick results, and is packed in a form that saves the farmers much in labor of transporting and applying. It is possible to use this material in an ordinary fertilizing attachment to a grain drill.

The company also expects to put the kilns in operation for burning lime and will also produce commercial crushed stone.

## The Color Factor in Talc

A very pure white is demanded by many consumers of talc, but no standard, accurate method of detecting slight differences in color has been devised, states R. B. Ladoo, mineral technologist of the Bureau of Mines, who has completed a study of the mining, milling and uses of talc for the Department of the Interior. Practically all talc producers make a rough comparative test by the unaided eye, usually comparing tales to a sample taken as a standard, which varies for each producer and consumer. The talc is either placed in little heaps or is spread out flat with the finger or a knife, on the hand, or on blue or white paper. Probably the best method now in use consists of forming two small piles of the material used as a stand-

ard and of the talc to be tested, pushing the heaps close together and flattening them with a spatula so that the contact between the heaps is a smooth straight line. If the talcs are then wet with a few drops of turpentine, slight differences in color may be detected; but even this method is not satisfactory, as no standard samples are used in common by the whole industry, and differences in light and in human perception give different results. Often the accurate determination of slight color differences is of utmost importance, for color is not only an index of value but frequently is an indicator of proper methods of grinding. Poor color is not always due to impurities, but may be due to insufficient methods or improper grinding. Thus a yellow hue in a talc was attributed to iron, but microscopic examination proved that finer grinding would eliminate most of the objectionable tint. Finer grinding of many talcs improves the color. A uniform and standard method for the determination of color should be devised and adopted.

The contract for the erection of the State Cement plant at Sioux Falls, S. D., has been let to Carlson and Snitkey of Sioux Falls. These buildings will call for an expenditure of about \$500,000, and work will be started at once. The total cost of the cement plant is estimated at \$2,000,000.

Mr. Harold H. Perry, Manager's Assistant, of the Industrial Works, Bay City, Michigan, sailed April 28th for England. While he is abroad, Mr. Perry intends to make an extensive study of locomotive and wrecking cranes as used in that country.

## Preparing Cost System

### Sand and Gravel Association Has Expert at Work — Other Washington News

(By Our Washington Correspondent)

In a decision rendered by the United States Supreme Court May 21, it was held that a state cannot control freight rates upon a commodity shipped between points within its border when the article is intended for public improvements. The court rendered its decision in two cases brought by the United States, the Interstate Commerce Commission and a number of railroads against the state of Tennessee. In complying with the orders of the Interstate Commerce Commission for an increase in freight rates upon railroads on state traffic, Tennessee, through its railroad and public utilities commission, provided that the old rates should be maintained upon carload shipments of stone and gravel within the state when intended for use in building public highways. The state won in the United States district court for middle Tennessee.

The National Association of Sand and Gravel Producers has almost completed a uniform cost accounting system which will be adaptable to each member's operations. This system will form a part of the association service and will be furnished to members only. An expert accountant has recently looked over typical sand and gravel plants with a view to outlining the system. A widespread interest has been manifested in the adoption of a uniform cost accounting system, and at the last annual convention the preparation of such a system was laid down by the executive committee as one of the things to be accomplished by the association this year. It was felt that if all members used the same principles in arriving at their costs, a more healthful condition in the industry would be obtained and competition would be placed on a more intelligent basis.

The principal highways of every state should be constructed as rapidly as the available supply of labor and materials permits, and they should be constructed and maintained by the state highway departments and they

should be paid for by the people of the states as a whole, according to Thomas H. MacDonald, chief of the Bureau of Public Roads, Department of Agriculture. Mr. MacDonald says that actual road tests have shown that the annual saving in gasoline alone on the more important roads will, in some instances, more than pay the yearly cost of such roads, including a proper distribution of the first cost. The public pays for good roads whether it builds them or not. This fact alone, without regard to the increased need for highway transportation to supplement the railroads, the saving in wear and tear on vehicles, and the social, recreational and educational advantages of good roads in rural sections, Mr. MacDonald says, should cause the states to proceed with their improvement of their main roads as fast as physical limitations permit.

The burden of building and maintaining the main state roads must be shouldered by the state, in Mr. MacDonald's opinion. It is not fair to expect a country to provide for the construction and upkeep of the main state roads within its borders when, as is generally the case, the traffic on such roads comes in greater part from outside of the county. The attempt to finance the improvement of such roads has been the means of bringing a good many counties to the point where they are not able to properly provide for the feeder roads, which should be their principal concern.

The allocation among the states of surplus war materials available and suitable for road-building work has given a decided impetus to the building of good roads in every part of the country. On March 31, it is reported, 7,355 miles had been completed since the beginning of the fiscal year, and with three months of good construction weather still remaining it appears likely that the 10,000 miles completed in the preceding fiscal year will at least be equaled. At the same time prospects are good for rapid progress during the coming fiscal year, as on March 31 there was under construction 14,010 miles and slightly more than 10,000 miles in projects approved but which have not yet reached the construction stage.

A comprehensive study is now being made of the road needs of the national forests. The figures available indicate that to complete the necessary system



of forest development roads and trails, 13,560 miles of roads and 37,114 miles of trails must be constructed at an estimated expenditure of \$64,693,000. For the system of forest highways of primary importance to the states, counties, and communities the rough survey indicates that \$107,658,000 must be expended for construction or improvement. If the present current appropriations are continued, it appears possible to complete the development of an adequate road system within the national forests covering all requirements in from 20 to 26 years.

## Bowles in New Position

Dr. Oliver Bowles, mineral technologist of the Bureau of Mines, has been designated by the Secretary of the Interior as superintendent of the new mining experiment station of the bureau to be established at Rutgers College, New Brunswick, N. J., and which will specialize in problems involved in the production and utilization of the various non-metallic minerals. Dr. Bowles will enter upon his new duties July 1.

Dr. Bowles was born in Canada and educated at the University of Toronto, obtaining his degree of B.A. in 1907, and of M.A. in 1908. The degree of Doctor of Philosophy was conferred by George Washington University in 1922. He was engaged in field work for the Ontario Bureau of Mines during 1908-1910, and was instructor in petrography at the University of Michigan in 1908-09. Until 1914 he lectured on rocks and minerals at the University of Minnesota, and made a comprehensive study of Minnesota quarries. The results of this work have been published as Bulletin No. 663 of the U. S. Geological Survey. Since 1914 Dr. Bowles has been stone quarry and non-metallic specialist in the Bureau of Mines, and has written many technical papers and articles. His labors have recently been directed chiefly toward quarrying problems in the lime industry.

The new station will undertake selected problems in mining, treatment of non-ceramic uses of such non-metallic minerals as bauxite, feldspar, Fuller's earth, graphite, gypsum, limestone, mica, phosphate rock, salt, sand and gravel, slate, sulphur, garnet, asbestos, and talc.

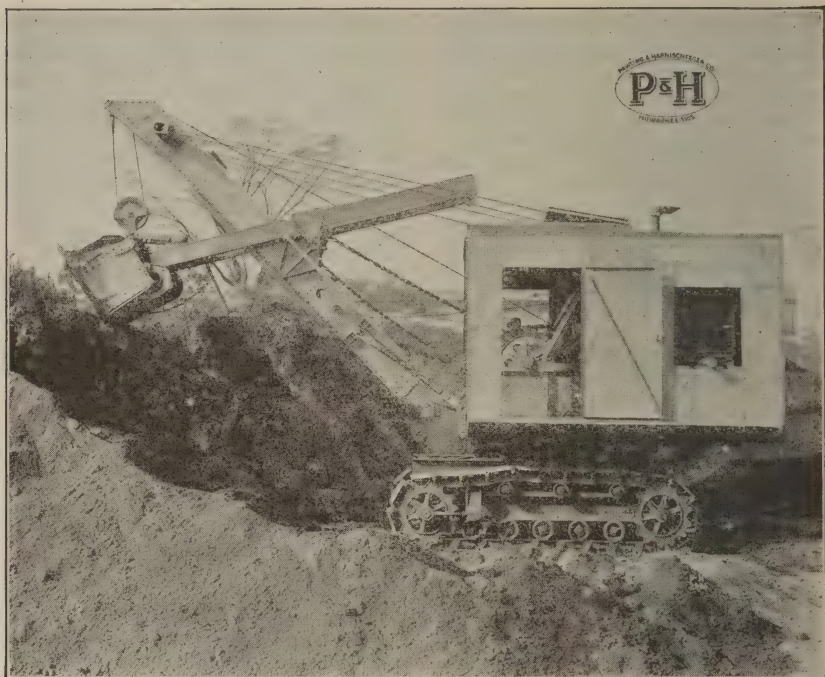
The Lake Sand Corp., has been incorporated at Chicago, Illinois, with a capital of \$150,000. Incorporators: M. Hausler, M. G. Hausler, Jr., F. Hausler, J. T. McDonough, E. M. Hausler, Wm. Hausler, C. C. Hausler, P. C. Darby, Ella Seip, L. Thorsen, and M. D. Wilson. Correspondent: Paden, Orayden, Kahn & Murphy, City Hall Square Bldg., Chicago.

The Peoria Builders' Supply Co., of Peoria, Ill., have taken charge of the washed sand and gravel business, formerly owned and operated by the Peoria Washed Sand and Gravel Co. This business was purchased by the McGrath Sand and Gravel Co., on February 1.

## Rutgers College to Study Non-Metallic Minerals

The Secretary of the Interior has designated Rutgers College, New Brunswick, New Jersey, as the location of a new mining experiment station of the Bureau of Mines, which will specialize in problems involved in the production and utilization of the non-metallic minerals. These minerals include bauxite, cement, clay, feldspar, Fuller's earth, graphite, gypsum, lime, mica, phosphate rock, salt, sand and gravel, sand-lime brick, slate, stone, sulphur, mineral paints, garnet, asbestos, and talc. The value of these non-metallic minerals produced annually in the United States is in the neighborhood of a billion dollars.

The choice of Rutgers College was determined largely by the fact that its location is a central one with reference both to the production and consumption of non-metallic minerals. The adjacent State of Pennsylvania alone has one and seven-tenths times as great a production of non-metallic minerals as all the States south of the Potomac and Ohio rivers combined. The New England and North Atlantic States, which are readily served from New Brunswick with a minimum of travel, have a combined non-metallic output of approximately  $3\frac{1}{2}$  times that of all the States south of the Potomac and Ohio rivers. Furthermore, about 75 per cent of the industries consuming the non-metallic minerals production center in the large industrial cities and are within easy reach of Rutgers College.



## A New Size Gasoline Shovel

A one yard capacity shovel, operated either by gas or electricity, has been brought out by the Pawling & Harnischfeger Company of Milwaukee, Wisconsin.

The new machine is very similar in design to the P&H  $\frac{1}{2}$  and  $\frac{3}{4}$  yard machines, which are being so widely used in all parts of the United States and even in India and Japan.

Being driven by gasoline or electric motor the machine is operated by one man, no fireman being required. The saving in this one man's wages alone amounts to a great deal of money.

Another feature of the gasoline or electric drive is the practical elimination of fuel and water hauling expense. Another advantage of the P&H is the ease of operation in inaccessible places. The P&H can operate at places where it would be impossible to operate a steam rig.

The crowding motion of the one yard shovel is of the standard P&H design. A manganese rack on the dipper stick is driven by a heavy thimble roller chain from a set of planetary gears. These gears are mounted on the forward drum of the machine.

This gives a positive crowding motion regardless of the position of the dipper and enables the operator to bite into the heaviest digging.

The machine is designed to come within standard railway clearances with only a minimum amount of dismantling. This is a very important feature for machines that have much moving to do.

The shovel is mounted on the well known P&H Corduroy Traction so called because it really lays its own corduroy road. The traction is very rugged being built entirely of steel and is non-cloggable even in the heaviest going.

The Continental Clay Co., of Columbus, Ohio, has purchased the property of the Glacial Sand and Gravel Co., at Zanesville. By this deal the Columbus concern has acquired one of the best glacial sand deposits in the state.

The Pembroke Limestone Corporation, Roanoke, Va., has been incorporated with a maximum capital of \$500,000, minimum \$250,000. President, James P. Woods; secretary, Frank W. Rogers.



## New Bay City Catalogue

The Bay City Dredge Works at Bay City, Michigan, describes Bay City equipment thoroughly in their new Catalogue E. The forepart of this book covers the one-man excavator, a machine that is primarily of interest to sand and gravel operators or other producers who require a small, inexpensive power shovel or crane. Pages 30 to 36 of the book are of interest more to road or general contractors, in connection with the Model 16 convertible crane excavator. This machine is illustrated with 6 different attachments, special attention being devoted to the skimmer scoop. Pages 38 and 39 briefly mention Bay City land dredges with various types of mountings.

The book is chiefly valuable because, rather than being devoted entirely to description, it is designed to include a great number of testimonial letters from present users. These letters cover pretty well the range of equipment shown and are representative of various sections of the country and various operating conditions. Copies of the catalogue may be had by addressing Bay City Dredge Works, Bay City, Mich.

## McMyler Interstate Crane

A bulletin describing the McMyler-Interstate 10-ton crawler crane tells the prospective user everything that they would want to know about this piece of equipment. This machine will operate with any steel bucket or with a lifting magnet, back filler or skimmer scoop. It develops a single line pull of 10,000 pounds and a single line hoisting speed of 200 feet per minute. It will handle a 30, 35 and 40 foot boom, swing five complete revolutions per minute, climb a grade of 30 per cent without load, travel on its own power at a rate of 100 feet per minute, travel in any direction regardless of the direction in which the boom is pointing, start in any direction without the assistance of a ground man, and give free power to the crawlers. Along with the bulletin containing the general description of the 10-ton crane, the company sends data and specification sheets and detailed drawing which show clearly all the characteristics of the equipment. This literature may be secured by writing the McMyler Interstate Co., at Bedford, Ohio.

## Baldwin Engineering Help

The Baldwin Chain and Manufacturing Co., of Worcester, Mass., manufactures a large line of chain, including steel rolled chain, steel block chain, malleable detachable chain, new chain replacement series, sprockets both cut and cast. The company offers to producers the use of its engineering department to aid in solving the problems surrounding the use of chain for transmission or conveying as related to modern operations. This chain is installed at many operations to which the company is glad to show prospective users. Additional information may be secured by writing the Baldwin Chain and Manufacturing Co., at their offices in Worcester, Mass.

## Erie Lubricated Caterpillar

The new Erie Bulletin on the Lubricated caterpillar type mounting deals entirely with this particular topic, taking up in detail the exclusive lubrication system which is explained on page 9, and another exclusive feature, the bushing of the link pin bearings which are shown on page 13. The manufacturers of this equipment claim for these two features the accomplishment of the saving of many thousands of dollars in these alone. The book is well and completely illustrated. Right hand pages are devoted to text and illustrations on the various features, left hand pages to a large number of pictures of actual installations accompanied by testimonials from the owners. The book is well arranged, attractively printed and bound, and would be of interest to the average producer. Copies may be had by addressing the Erie Steam Shovel Co., Erie, Pa.

## Link Belt Chain Drives

In a recent letter the Link-Belt Company asks users of machinery if they are satisfied with the way their machines are driven and invites them, if they are not satisfied, to investigate the possibilities of Link-Belt silent chain drives for which they claim an efficiency of 98.2 per cent. Enclosed with the letter is a return postcard, addressed to the Link-Belt Company, 910 South Michigan Av., Chicago, Ill., through which machinery users can order the 144 page Link-Belt Silent Chain Data Book, No. 125.

## Russell Grader Co. Line

In the road building and earth handling machinery catalogue of the Russell Grader Company of Minneapolis, are described a large number of devices that will be of interest to producers in this field. Among these are Russell drag line or power scrapers, hoists, stripping scrapers, belt conveyors, revolving screens, dump wagons and a number of other devices for application around non-metallic mineral operations. Copies of the catalogue may be secured from the Russell Grader Company of Minneapolis, Minn.

## "Mahrvel" Oil Equipment

After the producer in any of the non-metallic mineral industries has read through the Catalogue on oil burning equipment issued by the Mahr Manufacturing Company of Minneapolis, he will, besides knowing something about the "Mahrvel" line, very likely have learned something about oil burning torches for repairing steel plates, and about oil burning equipment of various other kinds. The book is devoted to many things that will not be of interest to producers in this field, but it also carries descriptions on a certain amount of equipment that would be of interest. Copies may be secured by writing the Mahr Manufacturing Company at the address given above.

## Oil Bearing Sands of Colorado and Wyoming

Nearly every thick bed of sandstone in the great Cretaceous system of the West seems to contain oil at some locality, but the exact number of these beds, the region in which each produces oil, and the identity and stratigraphic position of each have not yet been fully determined.

A recent brief report issued by the Department of the Interior as Bulletin 751-A of the Geological Survey entitled "Continuity of Some Oil-Bearing Sands of Colorado and Wyoming," by W. T. Lee, deals with the correlation of rocks in the lower part of the Cretaceous system in Colorado and Wyoming, and with the bearing of this correlation on the discovery of oil and gas. These beds have heretofore been known by diverse names, and in this report an attempt is made to show

their continuity through areas where they have been thus differently named. This identification of the beds furnishes to oil men a better basis for study and drilling. For example, the knowledge that a bed of sandstone which is known in some regions as the Dakota is in others known as the Muddy sand and that it overlies two other beds of sandstone that may be oil bearing is of obvious practical value to the oil driller.

## New Holland Machine Co.

The New Holland Machine Company of New Holland, Pa., manufactures engines and small sizes of rock crushing and pulverizing equipment. This equipment is described in detail in a number of pieces of literature, issued by that company. The literature is devoted in each case to consideration of one particular line—for example, there is a recent catalogue on New Holland oil engines. This engine is thoroughly described in the catalogue mentioned. In other pieces of advertising literature are described crushers and a number of other machines. These are mostly of small sizes. Additional information may be secured from the New Holland Machine Co., New Holland, Pa.

## Allis-Chalmers Official Passes Away

Mr. Henry Woodland, secretary and treasurer of the Allis-Chalmers Manufacturing Company, died suddenly at his home in Milwaukee on Monday, May 14th.

Born in Utica, N. Y., Mr. Woodland at an early age became connected with the New York Air Brake Company of Chicago. Later he was treasurer of the Gates Iron Works of Chicago. When in 1901, this company was taken over in the consolidation which formed the Allis-Chalmers Company, he became assistant treasurer of the new organization and afterward its treasurer. In 1916 he was elected secretary and treasurer of the company.

At the time of his death he was also vice-president and a director of the Hanna Engineering Company of Chicago.

A man of striking personality, keen judgment and extraordinary business sagacity, it was, however, Mr. Woodland's kindly, genial nature, his quick



sympathy and warm friendliness which so endeared him to the host of friends who mourn his death.

### Mead-Morrison Hoist Line

Catalogue 21 of the Mead-Morrison Manufacturing Co., describes in detail the large line of hoisting machinery manufactured by this concern. Catalogue 21 is a book of 168 pages that is divided into four sections—steam hoists, electric hoists, belts and gasoline hoists and grab buckets. Under each of these headings various pieces of equipment are treated in detail. Many hoists of the company's manufacture intended for specific uses are described by text and illustration. The line is a large one and it is only by carefully arranging descriptions in this manner that justice can be done to the various types of equipment. Copies of the literature may be had by writing Mead-Morrison Manufacturing Co., at their executive office in East Boston, Mass.

### Exports of Quarry Machinery

Mining and quarrying machinery is listed among the 100 chief exports from the United States according to value for the year 1922, in the summary of our world trade prepared and distributed in pamphlet form by the Chamber of Commerce of the United States. According to figures compiled of the export trade, mining and quarrying machinery for the year amounted to \$6,571,000. This is in addition to boilers and engines for power plants, and locomotives and other equipment which goes with this class of machinery, and taken all together makes a good showing. Moreover the interest in good roads in other countries speaks well for the steady growth in the export trade in quarrying and crushing machinery.

### National Hoisting Engine

The sixth edition of the National Hoisting Engine Company's catalogue of their equipment tells interestingly of hoists and engines built by this company. The catalogue has rather a different look from most that reach our desk; yet a very familiar look, too, for it is illustrated almost entirely with woodcuts. The first 68

pages are taken up with descriptions of specific pieces of equipment ranging from complete hoists with engines down to small hardware parts. The balance of the book is taken up with illustrations of installations in various fields. The National Hoisting Engine Company of Harrison, N. J., will mail copies of the sixth edition of their catalogue to readers of PIT AND QUARRY upon request.

### Milwaukee Gas Locomotive

The Milwaukee Locomotive Manufacturing Company of Milwaukee, Wis., have an interesting line of literature on the Milwaukee Gasoline Locomotives. These various pieces of literature are beautifully illustrated and contain complete descriptions. Throughout the series of advertising pieces are shown many of the uses in this field to which Milwaukee gasoline locomotives are at present being adapted. The advertising literature is apparently prepared largely upon the belief in the saying that "a good picture is worth a million words." Descriptions are no longer than is necessary to cover the ground. Copies of this company's literature may be had by writing the Milwaukee Locomotive Manufacturing Co., at Milwaukee, Wisconsin.

A \$50,000 plant for the milling of feldspar quartz and mica from the quarries of the Basin Quarries, Inc., will be erected at Phippsburg, Oregon. The company, which is capitalized at \$100,000, has for its president, Mr. Joseph F. Perry. Frank R. Marston is vice-president and Wm. C. Sherburne, treasurer.

The Winnebago County Labor Legion, Winnebago, Illinois, has endorsed a movement for the establishment of cement plant to be owned, operated and controlled by the State of Illinois. Such an institution would doubtless reduce the cost of concrete for the big road construction program which the state is contemplating during the coming years.

The Sparta Limestone Quarries, Inc., Sparta, Illinois, has been incorporated with a capital of \$8,000. Incorporators: T. A. Roussin, G. W. Bevington, N. R. Lessley, H. J. Holdoway and Geo. F. Eiker, Correspondent, Thos. P. Edgar, Sparta.

## Heavy Trade in East

### Producers Kept on Edge to Get Most From Situation

By Our Eastern Correspondent

Heavy production and heavy distribution are the order of the day in the eastern sand, gravel and crushed stone markets. There is no let-up in the volume and keenness of call and producers are being kept on edge to handle the business that is going forward. All lines of industry which require rock and gravel materials are prominently in the market, and present indications point to a continuance of peak conditions for several months to come.

The construction industry at New York and vicinity maintains at a high point of activity, considerably in advance of this same time a year ago, and is a leader in demand for sand, gravel and kindred materials. Despite the fact that a number of large projects are to be held in abeyance until building costs are lowered, there is no noticeable relinquishment of operations, for the numerous smaller jobs are more than sufficient to keep producers, dealers and construction interests busy.

Building supply dealers are turning large quantities of sand, gravel and broken stone, seeking at the same time to hold up with reasonable reserve stocks. This is bringing increased business to the producing end, for contractors and others who purchase direct in quantity lots are forward with similar demands. Practically every workable pit is on the producing list, and a goodly number trying to secure larger working forces—almost an impossibility under the present conditions.

While there is no pronounced shortage of labor, there are more jobs than there are men willing to work. In consequence, there is a bidding for good help and natural raise in wage scale. Sand producers and clay mining interests are paying 45 and 50 cents an hour in the Raritan River section of New Jersey, just as is being paid in Long Island districts, and the men are not thoroughly satisfied. There is every appearance of an early demand for 5 to 10 cents more in this level and rather than meet this advance, it is likely that some producers

will curtail their operations. This is the current sentiment.

There is a stiffening in quotations in the sand and broken stone markets, giving indication of ascending levels. Sand has already been moved forward under the heavy demand, and good quality washed gravel carries and indication of soon following. The threatened "buyers' strike" in the building trades certainly has not brought any easing in quotations up to the present time, and there is quite a definite aspect for a holding strictly to current figures.

Good quality sand has advanced in the wholesale market at New York from \$1.00 to \$1.25 a cubic yard in cargo lots, a situation that was prophesied in these columns in the last issue of PIT AND QUARRY. The change is due to higher labor costs. Brisk sales continue and the outlook for heavy consumption is good. Dealers are asking \$2.25 and \$2.50 for the material on the job, and there is now a strong tendency towards the latter quotation. There is still no change in fine white sand, which is being sold at \$4.50 a cubic yard, delivered.

Best washed gravel is being quoted at the recently established \$2.25 a cubic yard level, both for  $\frac{3}{4}$ -inch and  $1\frac{1}{2}$ -inch stocks, carload lots. There is a good call for the material and stocks are rapidly absorbed. New York supply yards are selling gravel at \$2.75, delivered on the job, while a number of Brooklyn dealers are asking a shade higher.

Crushed stone shows no change in the well-established levels of \$1.65 and \$1.75 for  $1\frac{1}{2}$ -inch and  $\frac{3}{4}$ -inch sizes, respectively, in wholesale lots. At the same time, the heavy advance in road construction and accordant growing call for stocks, have developed a marked firmness in the present figures, and an increase in the near future would not occasion any great surprise. Supply dealers are quoting \$4.00 a cubic yard for broken stone, delivered.

Portland cement is operating under a keen demand and large tonnage is being absorbed throughout the eastern district. The price level is holding to the figures recently established, or \$2.30 and \$2.35 a barrel, less sacks, alongside dock to dealers, and \$2.70 and \$2.80 delivered by truck. In the retail market, consumers are paying \$3.20 a barrel, delivered, with the regular bag rebate of 10 cents each.



Nearby mills in New York state and eastern Pennsylvania are receiving heavy orders from this district and every effort is being made to furnish the demand, regardless of length of motor truck haul, where the freight situation is still unreliable.

The properties of the Garnet Grit Co., Danbury, near Franklin, N. H., recently acquired by the Ford Motor Co., Highland Park, Mich., will be actively worked by the new owner according to present plans. It is proposed to install a modern quarry plant, with separating, pulverizing and grinding mills in the immediate vicinity near the Wilmot highway. The entire tract approximates 200 acres of land, and the new plant is estimated to cost in excess of \$100,000. The garnet material will be used by the Ford company at its glass plant in Pennsylvania for polishing service.

The Deer Island Granite Corporation, Stonington, Me., has been formed under state laws with a capital of \$50,000 and 2,000 shares of stock, no par value, to operate a granite quarry in this section. Frank McGuire is president, and A. E. McGuire, treasurer. Percy T. Clarke, Stonington, is representative.

The Granite State Quarries Co., Concord, N. H., recently organized, has acquired extensive properties on Rattlesnake Hill and is perfecting arrangements for a large output of rough stone for building and memorial purposes. Improvements will be made in the present plant and employment given to about 75 men for initial operations. This number will be increased to more than 100 workers at an early date. Charles L. Jackson is president, and George A. Ledward, treasurer and general manager.

The Worlock Stone Co., Perryville, N. Y., is said to have plans under consideration for the rebuilding of its crushing plant and auxiliary works, destroyed by fire on April 30, with loss estimated at close to \$100,000, including machinery. The reconstruction is expected to cost approximately a like amount. Royal D. Woolsey, Canastota, N. Y., is one of the heads of the company.

The Lima Quarries, Inc., Lima, N. Y., has been organized under state laws with a capital of \$100,000, to operate a stone quarry in this section. The new company is headed by J. S. Crouse, F. McDonald and W. Le Feber.

Slate quarries at Granville, N. Y., have granted a wage advance of 7 cents an hour to workers in different departments, affecting all branches of production. The men asked for a 10 per cent increase and a compromise was made at the rate noted. Under the new scale trimmers will receive 57 cents an hour; splitters, 58 cents; and block cutters, 60 cents.

The Tuckahoe Stone Corporation, East Chester, N. Y., has been formed under state laws with a capital of \$50,000, to operate a quarry and general stone works. The company is headed by A. Bianchi and D. Beretta. It is represented by Clark, Close & Davis, White Plains, N. Y.

Arrangements are being made for a dissolution of the partnership between Charles T. Kavanaugh, Graham Van Keuren and Samuel P. Martin, all of Paterson, N. J. covering the operation of the Sussex Quarry at Wantage, Sussex County. The plant has been producing stone for road construction purposes, and it is likely will be continued in operation under an individual ownership.

The Grove City Limestone Co., Grove City, Pa., is maintaining active operations at its plant and furnishing large quantities of material. Spring delivery for limestone for agricultural purposes has run into thousands of tons, and the plant is sold well ahead on ground stone for this service under capacity output. The call for nut sizes of material for road work is now increasing and arrangements are being made for large shipments to different nearby points.

The American Slate Works, Slatington, Pa., have plans under consideration for the rebuilding of the portion of their plant destroyed by fire on May 5, with loss totaling close to \$100,000, including machinery. The plant consisted of a main four-story structure, 100x175 ft., equipped for roughing and finished production. William Harding is general manager.

The stone quarrying industry is undergoing a revival at Nicholson, near Wilkes-Barre, Pa., and several companies are perfecting plans for the reopening and operation of existing quarries, now long dormant. New machinery, pumping equipment and other apparatus will be installed. Up to about twenty years ago, this was one of the leading lines of activity here.

## Banner Weeks at Lehigh

### Mills, Worked up to Greatest Capacities, Break Records

These are banner weeks among the cement mills in the Lehigh Valley district of Pennsylvania. Every mill is busy, working to greatest capacity and new high production records are being established in a number of instances. The demand is holding up with increased force and orders on hand at the different plants are more than sufficient to insure maximum output for a number of months to come. The call from the construction industry which grew so intense in March is now being duplicated in the demand for material for new road construction, and practically every eastern state is drawing cement for this purpose.

With the production and distribution of cement for March and the first quarter of 1923, greater than for any similar period in the history of the industry, there is little question but what the second quarter of the year, now well advanced, will produce a similar record; it would not be surprising to see it higher. There has hardly ever been a time when the industry is so on edge as now found in the Lehigh Valley section.

As to be expected, labor is in firm demand in this district and good men have no trouble in securing employment at wages equal to those now prevailing in the steel business and other basic industries. But few mills have their full requirements in this line and while there is no distressing shortage of men, there is certainly no surplus. The wage situation since the advance of 5 cents an hour in April is satisfactory and there is no immediate trouble in sight between companies and workers.

The heavy call for production finds no relief in the available freight cars for distribution, and transportation is one of the problems now before the mills. The railroads to all intent are doing their best as regards the supply of rolling stock and movement, but there is still much to be desired. Fleets of motor trucks are being enlarged and this means of transportation, even though it means an increased cost to the consumer, is assisting materially in relieving what would otherwise be a serious congestion.

Happily, the mills in the Lehigh Valley district are so located with respect to primary market centers as to be able to utilize this means of distribution most effectively. The heavy truck loads leaving the plants are expected to continue well through the summer months, just as will the long trains of freight cars moving from these parts.

The big mill of the Atlas Portland Cement Co. at Northampton is maintaining operations on a full basis and every department of the plant is busy. All available men are being pressed into service and further additions are contemplated. Other plants of the company are equally active and there is no thought of any letup at the present time. Heavy production records are being established.

The Dexter Portland Cement Co., Nazareth, is running full and has followed the lead of the other companies in advancing the wage scale at its mill. Big orders are being slated for material for earliest possible delivery and no department of the plant will slacken except under extreme urgency for necessary repairs to equipment. Almost needless to say, a full working quota is being employed and efforts are being made to secure more men.

Both mills of the Coplay Cement Mfg. Co., Coplay, continue on the active list and record production is being developed in a number of departments. It is expected to maintain operations at the present status for an indefinite period and incoming orders lend all possible encouragement to the present peak situation. The company has recently filed a complaint with the State Public Service Commission against the Philadelphia & Reading Railroad Co. and the Iron ton Railroad Co., holding that a discriminatory freight rate prevails on limestone from Myerstown to Coplay and Saylor, as compared with the tariff to other points of like distance. The case is expected to be heard at an early date. The company is a large consumer of limestone from the district noted.

The Lehigh Portland Cement Co. has all of its mills on a full production basis and is among the leading heavy producers in this district. The West Coplay and Ormrod works are said to be giving employment to more operatives than ever before, while the new Castle and Fogelsville mills are also heavy in this line. The latter



plant has been thrown open a number of times in recent weeks to students from eastern universities, who are making tours of inspection through this region. A large body came recently from Lehigh University, closely followed by others from Lafayette and Villa Nova; a delegation from Columbia University, New York, will visit the mill at an early date. The company is taking the visitors through the entire plant, from quarry to laboratory, and usually under the able guidance of Howard Rhode, head of the service bureau. Arrangements are being perfected for the early operation of the initial unit of the new mill of the company at Tarrant City, near Birmingham, Ala., upon which work has progressed rapidly through the winter months; it will be ready for service soon, and is expected to assist materially in helping to supply the call for cement.

The Alpha Portland Cement Co., Easton, Pa., is running under maximum output at its different mills, including the Martin's Creek plant, and has no intention of any curtailment. The Giant Portland Cement Co. is equally active at its mill at Egypt, as is also the Lawrence Portland Cement Co. at its Northampton mill. The Bath Portland Cement Co. is busy at the Bath, Pa. plant, with large working force.

The mill base in the Lehigh Valley district holds at \$2.10 a barrel in carload lots, without bags, to contractors and dealers. This quotation seems quite well established, despite the fact of increased cost of production. It is evident that cement producers intend to hold to this level just as long as possible, and probably will withhold any advance through the summer season. A check has been given to the practice of "pyramiding" orders, as evidenced in a number of cases earlier in the season, whereby a purchaser would place orders with two or three mills at the same time in order to insure supply. This has led to difficulty and confusion, at the same time exaggerating the consuming demand.

The same base rate noted above applies at the present time at Mitchell, Ind., where the Lehigh Portland Cement Co. has a large plant; this \$2.10 figure also holds at La Salle, Ill.; Hannibal, Mo.; and Mason City, Ia. A \$2.00 level is current with the Universal Portland Cement Co., at Uni-

versal, Pa., while a \$1.95 base now prevails at Steelton, Minn. and Bufington, Ind. The Atlas Portland Cement Co. and the Knickerbocker Portland Cement Co., are asking \$2.20 at their mills at Hudson, N. Y., and this same base is current at Fordwick, Va., The rate at Wyandotte, Mich., has declined to \$2.30 a barrel, the highest base at any of the mill points.

The Marquette Cement Mfg. Co., Chicago, Ill., with mill at La Salle, has added to its holdings by the purchase of the plant of the Cape Girardeau Portland Cement Co., Cape Girardeau, Mo., for a reported consideration of close to \$2,000,000. The new owner will take immediate possession and purposes to develop maximum production. The plant has a rated production of about 25 cars a day and has been giving employment to approximately 200 men. It is said that the Marquette company will make extensions in the mill in the near future for larger output.

Activities in the cement industry on the Pacific Coast are reaching a peak condition, not only with regard to the operation of existing mills but in connection with the outlook for new construction. Property has been acquired at Exeter, Cal., by a company now being organized, headed by John F. Hamburg, an official of the Engels Copper Mining Co., Mills Building, San Francisco, to be used as a site for a large mill. The new company will be capitalized at close to \$5,000,000, and purposes to dispose of bonds and stock to an amount of about \$4,000,000, of which a large portion will be used for the new plant. The property is in the center of the San Joaquin Valley section, and comprises a large deposit of cement rock. A quarry plant will be built, with railroad line to the plant site, and the mill will consist of a number of main units for extensive production. The Yosemite Cement Co., recently organized by interests at Kansas City, Mo., and vicinity, has commissioned the Hunt Engineering Co., of that city, to prepare plans for its proposed new mill on the Merced River, near Merced, Cal., where a site of close to 1,400 acres of land has been secured. The plant will consist of a number of buildings, with power plant, machine shop and other mechanical structures and is estimated to cost more than \$1,500,000, with machinery.

## Indiana Ag Rate Down

### Drop of 25% With Publication of New Tariff

By Our Indianapolis Correspondent

Indiana intrastate freight rates on agricultural limestone, used by farmers for soil treatment, will drop an average of about 25 per cent as soon as railroad companies can publish the new tariffs, John McCardle, chairman of the public service commission, has announced. He said "an immense amount" of the soil medicine is transported in Indiana each year.

"Mr. McCardle made the announcement at the end of a conference between Leo P. Day, an attorney for the New York Central Railroad Company and other railroad representatives, with O. P. Gothlin, the commission's freight rate expert. The new rates will come, Mr. McCardle said as the result of an agreement proposed by the railroads to settle a case Mr. Gothlin was pressing against them on behalf of the Indiana State Farm which manufactures much prepared limestone.

The Indiana Highway Commission has placed orders for crushed stone and gravel to the amount of \$50,000, and in the next few days active operations will begin in placing non-rigid type roads in good condition for spring and summer traffic. This material will be distributed over 13 state roads and as they are repaired other highways of the Indiana system will receive attention as they show wear.

Members of the commission returned yesterday from a trip over southeastern Indiana highways which they found in good condition. "Contractors are busy on new state highways throughout Indiana," said John D. Williams, director of the commission, "and work on them will be pushed to completion."

The commission will this year build about 50 miles of roads of the penetration type, and the locations will be announced soon.

Contractors building roads for the state highway commission must complete their projects on scheduled time this year or they will be regarded as unfit to compete in the bidding for 1924 contracts, according to John D. Williams, director of the commission.

"Indiana is going to have a completed system of main market highways not only connecting all parts of the state, but facilitating interstate and transcontinental traffic by the end of 1925, and the state highway commission does not propose to be delayed by the failure of contractors to complete their work within a specified time," Mr. Williams said.

"Under the three-year paving program of the commission, 153 miles of highway will be hard-surfaced this year, 405 miles in 1924 and 400 miles in 1925, Mr. Williams said. Mr. Williams said that in 1922 the paving program proposed for the year was almost entirely completed on time. The warning, he said, is to improve if possible, even that record.

The first day of June will see more overhead tacked onto the trade in Indianapolis and in the entire state for that matter, in the shape of a special tax of two cents per gallon on all gasoline used in trucks and automobiles. The bill passed the last legislature by a bare majority, a big fight against it being waged by representatives from the larger cities especially. It was pointed out during the session that retail establishments in the larger cities who operate trucks seldom send their trucks outside the city and the purpose of the tax is to raise more money for country road improvements. The contention of the city retailers was that if such a tax were imposed the money should go to improving city streets instead of country roads. There was a sufficient preponderance of country vote, however, to put the measure over and it was signed by the governor. The farm vote, however, saw to it that gasoline for tractors used for farm work was exempt from the operation of the law. Truck users here estimate that each truck will cost from \$35 to \$50 more per year to operate and they allege they will get no benefit from the money at all. Other than the farmers' tractors, the only form of gasoline exempted from the operation of the law is that form of naphtha known as cleaners' naphtha used by cleaners and dyers.

The Bromide White Lime Company, Kansas City, Mo., has increased its capital stock from \$100,000 to \$200,000.



## Pittsburgh Prices Same

### Establishing Output Records and See Good Season

By Our Pittsburgh Correspondent

The development of the spring season has brought rapid development in the production end of the sand and gravel industry at Pittsburgh, Pa., not to mention the accordant heavy distribution which has maintained for a number of weeks past. All of the producers are busy and the larger companies are keeping their fleets active on the rivers. High records for outputs are being established and there is every evidence of banner conditions for the coming months.

Prices hold substantially the same as those quoted in these columns in the May issue of PIT AND QUARRY. Good washed gravel is being sold f.o.b. floats at the Pittsburgh landings at \$1.60 a cubic yard, while delivered on the waterfront the price stands at \$2.00; for trucking the material to destinations from \$2.50 to \$3.00 is asking. River sand is now priced at \$2.40 a ton in the retail market, delivered on the job, while in the wholesale market the figure is a little more than \$1.00 lower. The material is operating under a good call.

Broken stone is quoted at \$2.85 in the local wholesale market, for ¾-inch and 1½-inch stocks. Dealers are asking well around \$4.00 for delivered material. Portland cement holds at \$2.24 a barrel in cargo lots, wholesale; retail, a \$3.50 figure prevails, with regular 10-cent bag rebate. Crushed slag is being sold in carload lots at the plants at \$1.25 a net ton.

The Monongahela & Ohio Dredging Co. has been active during the past month or more in dredging sand and gravel with its dredger "Wabash," near Point Pleasant, and heavy shipments are being made to the local port and other points. The company has been using its dredgeboat, "Northern," at Colona, on the Ohio River, where a new landing is being made for the Colonial Steel Co. The dredger "Franklin" will be placed in service on the river at once.

The Valley Sand & Supply Co. is maintaining active operations with its fleet and doing a large business. A number of flat boats and other vessels have undergone necessary repairs for the spring season, and will

be kept on the producing list for an indefinite period.

The Iron City Sand Co. has completed repairs to its steamer, "P. M. Pfeil," and will keep the vessel in active service on the river for hauling tows of sand and gravel from the dredger "Independent," stationed on the Monongahela River; operations are also being conducted at other points. Barges have been repaired recently for the company at Frank L. Hankey's boat yard, and the fleet is in excellent trim for heavy service.

The Duquesne Slag Products Co. is using its oil-burning towboat "Luzerne" on the Monongahela River, and daily trips will be made to haul material from Monessen to Allenport for an indefinite period.

The Keystone Sand & Supply Co. has completed a new unloading dock at Munhall on the Monongahela River, and will place the structure in service at once. The use of the new dock is expected to assist materially in operations at this point. The company has secured an order from the local Government engineers to furnish sand and gravel for the new esplanade to be constructed at Lock No. 6 on the Monongahela. Extensive production is being developed and the company dredgers will be active throughout the spring and summer months.

The Santiago Creek Rock & Gravel Co., Anaheim, Calif., has recently been incorporated with a capital of \$50,000. The directors are: H. M. Dailey, J. Renfroe, L. H. Calderwood and F. R. Dennison.

Cement manufacturing plants in Western Washington are running under capacity production, giving employment to large working forces. It is said that orders on hand and incoming business are sufficient to insure the present basis of output for the remainder of the year. The International Portland Cement Co., Ltd., is busy at its mills, as is also the Inland Portland Cement Co., with plant at Metaline Falls. The Superior Portland Cement Co., Seattle, is producing under maximum operations at its mill at Concrete, and has plans in prospect for the construction of a new hydroelectric generating plant for additional power supply. Application for a site has been made to the state. The station will cost in excess of \$150,000, with machinery.

## Texas Building Active

### Road Activity Also Keeps Sand and Gravel Men Busy

By Our Dallas Correspondent

Continued building operations, with no let-up in the demand for sand, gravel and other building materials, are noted in Texas, especially in the larger cities. Several large contracts have recently been awarded, or bids have been asked, and numerous office structures, schools, churches, and mercantile establishments are being erected throughout the state. Several of the larger cities of Texas, notably Dallas, Houston, Fort Worth and San Antonio, are building steadily and the demand for sand and gravel is reported especially strong in these cities.

Dallas is soon to undertake the erection of a \$5,000,000 office building and warehouse to be built in co-operation with the Gulf, Colorado and Santa Fe Railway Company as a freight terminal and office building. This structure will call for large quantities of sand and gravel, and the material will be drawn from the pits near Dallas. Contracts have not been let, although several gravel dealers are preparing estimates and are figuring on these contracts.

Road improvement is in full swing in all parts of Texas, and hard-surface highways predominate in the construction. Gravel surfacing ranks next, and is employed generally on roads where there is little heavy hauling. Dallas county is now building the Belt Line, a gravel highway encircling the city just inside the county line, about 75 miles in length. Much of the gravel used on this highway is being furnished by gravel dealers to the county under contract, although the county is taking some gravel from its own pits.

Weather during the last few weeks has been favorable for hauling. There has been only limited rainfall and the roads have not become impassable. Motor trucks and wagons and teams have been able to negotiate the highways practically all the time.

The City of Dallas is now entering on an extensive street paving program, and is using large quantities of sand and gravel in laying concrete

base on which a topping of asphalt is being spread.

Tarrant and Johnson Counties adjoining Dallas County, are also engaged in building good roads under programs calling for the expenditure of large sums of money and the construction of highways along well defined lines reaching all parts of the counties as well as providing hard surface highways for the main state and national highways crossing these counties. Johnson county recently contracted for gravel from extensive pits near the city of Cleburne, owned and operated by private individuals. The county also purchased some gravel land and is now working its own pits.

Other counties over the state are also carrying out road building programs, and Texas now is building more improved highways than any other part of the country.

With the unusually heavy demand for sand and gravel, prices have remained unchanged in Dallas. Dealers generally report that they are working their pits to capacity, and have orders booked ahead, yet the price has remained stationary. Gravel is being delivered on the job in Dallas at prices ranging from \$2.25 to \$4.00 per cubic yard, depending on the distance hauled and conditions of delivery. Gravel f.o.b. cars at the pits can be had for \$1.50 per cubic yard.

One of the most profitable sand pits in Texas, it is disclosed, is that operated by A. J. Justice, a ranchman near Justiceburg, in Garza county. Mr. Justice found an excellent quality of bank sand on his ranch, and introduced the Santa Fe to build a spur track to the pit. A steam shovel and drag line were installed for loading, and Mr. Justice is now receiving a net revenue of \$20,000 a year from the sand taken out of this pit. Good building sand is comparatively scarce in that section, and Mr. Justice is able to dispose of all the sand he can take from the pit.

The City of Cisco, in Eastland County, has awarded a contract for twelve blocks of brick pavement, to cost \$40,700. Work is now under way on the paving. When these twelve blocks are completed, Cisco will have more than eighty blocks of street paving.

Kaufman County, Texas, is entering on a road improvement program call-



ing for the expenditure of \$1,000,000. S. J. Treadway, formerly of Temple, Texas, has been employed to take charge of the work. Twenty miles of highway to be built by the county will be of concrete, and about fifty miles of gravel.

Henrietta, Texas, in Clay County, has made headquarters for road construction to be undertaken in that county. A bond issue of \$2,500,000 was recently voted, and contract soon is to be awarded for the construction of a concrete highway entirely across the county along the Colorado-To-The-Gulf highway, a distance of more than 40 miles. Considerable gravel roads will be built, leading to the concrete highway.

The Universal Gypsum Company has recently been organized at Sweetwater, Texas, for the purpose of establishing a plant there for the manufacture of cement, plaster and similar building materials. An extensive bed of gypsite has been located northwest from Sweetwater, near Rotan, which will be worked by the company. A large plant is being built, to be operated by electric power, and it is expected to be in operation soon.

E. L. Bevington of Chicago, has become interested in the development of Texas clay deposits, which, he says, is the finest in the world for the manufacture of chinaware. A large plant is to be established in West Texas for the handling of this clay.

Announcement has been made by officials of the Endowment Fund for DePauw University at Greencastle, Ind., that the Midwest Crushed Stone Quarries of that city, is among the twenty business organizations there to donate \$1,000 or more to the fund.

The Pleasant Lake Gravel Co., an Ohio corporation has qualified to do business in Indiana with a total of \$45,000 of its capital represented in the state. The company will do business in gravel, crushed stone and sand, and H. A. Perry of Pleasant Lake, Indiana, has been named as agent.

The Milford Gravel Co., of Ligonier, Ind., has purchased the farm of Wm. Francisco, three miles east of Ligonier, and are erecting a large gravel plant which they intend to operate on an extensive scale.

## Lime Prices Guaranteed

### New York Market Will Remain Stable for Current Year

Barrelled finishing lime interests in New York were the first to meet labor's defi to standardize their prices to the building investing public as a component of a similar movement on the part of organized building craftsmen.

Edward B. Page, New York manager of the Rockland-Rockport Lime Company, one of the dominant distributors of barrelled finishing lime in the eastern part of the United States, commended the attitude of labor in its willingness to forestall a general buyers' strike in the building industry, announced that his company had guaranteed dealers and distributors wherever his company served, against any price change for his company's commodity from now until January 1, 1924.

C. J. Curtin, one of the leading manufacturers of lime in New England, advised the Dow Service Daily Building Reports of his decision to meet the situation as squarely as the labor interests have put it up to building investors that as far as Farnham-Cheshire finishing lime was concerned, he had already guaranteed the trade against a price advance for the remainder of 1923.

The lime men tersely summed up their policy as follows:

"The building industry needs more labor. It cannot wait for labor to come in by virtue of legislation affecting immigration. If labor is willing to take its place in line to insure a longer period of building prosperity and the mason material dealers can have adequate protection against price advances for the remainder of the year, there is no reason why this era of building prosperity should not continue. The postponement of Government and other big building projects in a tight building market like the present one, is salutary. Labor makes a conciliatory move. It invites building material manufacturers, dealers and contractors to meet them four-square purely for the purpose of insuring a continuation of prosperity in the form of building construction progress spread out uniformly instead of attempting it at a peak. The line is thus clearly defined for the entire building industry."

## Fight Wages in Ohio

### And Is Likely to Continue for Another Month

By Our Cincinnati Correspondent

The holding up of road building work in Ohio is beginning to reach the pinnacle point in the complex situation between the political fight of Governor Donahey and State Highway Director Leon C. Herrick. The Governor has declared that the road material interests have a stranglehold upon the highway department as now operated. The Democratic Governor finally has refused to permit the Republican Director of Highways to go ahead with his road building program by refusing to permit the state director of finance to pay money on old contracts awarded. Latest developments are court actions by construction companies to compel the finance director to certify estimates.

On May 14th, the Highway Construction Company of Elyria, O., instituted suits to compel Finance Director W. E. Baker to certify current estimates due on four highway jobs partly completed by that company. The projects in question involve some \$600,000.

In the meantime State Highway Director Herrick is awarding contracts contrary to the orders and desires of Governor Donahey, who wishes to await the highway director's expiration of office July 1st. More than a million dollars was involved in contracts awarded during the middle of the month for various road building projects by Director Herrick, covering expenditures in all parts of the state. What the termination of this interesting and complex road building situation will be is of much interest to the basic material interests of Ohio who are pinning their hopes on a considerable road building program in the much needed sections of the state.

Production and sale of sand, gravel, and cement, including quantities of lime, reached almost unprecedented proportions during the first four months of 1923, according to building material men in the southern section of Ohio. The building boom which had its start the last quarter of 1922, swept on in increasing figures in 1923, calling on the available supplies of the basic materials. Although prices of sand and gravel have not reached the

high levels of other materials necessary to the completion of building, during the last few weeks, some hesitancy on the part of builders has been shown in further construction work on account of soaring prices. This hesitancy has of late had its reflection on the basic material market and late reports indicate that unless prices of other building materials come down, the favorable period enjoyed by sand and gravel producers and other material men will at least be temporarily enjoined. In the mean time prices are stationary. Washed gravel is quoted at \$1.50 a ton, f.o.b. cars, sand sells at \$1.20 f.o.b. cars. Prices for cement and lime are \$2.99 a barrel for the former and \$16.80 a ton for the latter.

President F. E. Hall, of the Ohio Sand and Gravel Producers' Association, is preparing steps for the Ohio association to take action on the 15 per cent increase on the tariff regulations on sand and gravel. T. J. Hall & Company, of which President Hall is the head, is moving right along with their river diggings, although the many May rains have handicapped production by creating high water conditions. Mr. Hall declares that much construction work is being held up on account of high building material prices, but predicts that the big period of construction work is yet ahead, and the sand and gravel may expect favorable developments.

The Ohio Ballast Gravel Company has received additional awards for supplying ballast to the various railroads.

Building material houses report an ordinary month of business. Some unsteadiness in new building, and the lack of a regular road building program being carried out in Ohio, together with many days of rain, have had a detrimental effect on the market during the month of May. The Cincinnati Builders Supply Company has been affected somewhat by the unfavorable weather, although a good business was consummated. L. G. Wilde of the company announces that there are adequate supplies of all materials on hand, in fact more than the normal amount.

W. J. Heintz, sales manager of the Moores-Coney Co., building supply house handling large amounts of basic materials in the southern district of Ohio, states that the market is firm



## Powdered Coal Firing In Vertical Lime Kilns

The use of powdered coal in the vertical kiln is suggested by one of our readers as the most desirable improvement that could be made in the lime industry, from the operating viewpoint. This gentleman, Mr. F. O. Cheney, of the Cheney Lime Company, Allgood, Alabama, says, "This field" the use of powdered coal in vertical kilns) "is unexplored so far as the lime industry is concerned. However, its use is standardized in many industries. We consider it practical but expensive to install. This would constitute the greatest step in the lime industry since hydration was developed."

In the abstract, powdered coal possesses many advantages over the same fuel stoked in the regular way. Still speaking in the abstract, lime could be made with greater ease, better control and more certainty of a superior product when using a fuel whose burning can be regulated more readily than the burning of coal in a regular fire box. Departing from the abstract and attempting to consider the subject in the concrete, we find our path beset by a variety of obstacles. To imagine a variety of ways in which powdered coal burners could be applied to a vertical kiln is easy. To actually apply burners in any particular way and with any degree of confidence is quite another thing.

In an academic discussion many reasons could be brought up for and against the use of pulverized coal and for and against particular applications of the method. But the truth will never be known until some producer shoulders the "white man's burden" and actually applies pulverized coal firing to an existing or a specially designed vertical kiln. It was so when the rotary kiln was first put forward as a piece of equipment that might possibly have a use in the lime industry. The "white man's burden" has not yet been laid down by the rotary kiln operators. They are still perfecting their equipment and developing standardized operating methods that will be the universally accepted practice of tomorrow.

The only thing that will really give light on the use of powdered coal in a vertical kiln is the installation by some producer of this method. Undoubtedly, many plants could in this way find

economies. On the face of it only a fair sized plant with a large demand for pulverized coal will justify the expense of installing a coal pulverizing unit.

Who will be the first explorer in this new field?

## Changes in Personnel of Bureau of Mines

During the absence in Europe of George S. Rice, Chief Mining Engineer of the Bureau of Mines, Department of the Interior, and until further notice, James W. Paul will be Acting Chief Mining Engineer, with headquarters at Washington.

C. A. Herbert is detailed to Pittsburgh to serve as Acting Chief Coal Mining Engineer, beginning June 1 for a period of five months, and will report through the Superintendent of the Pittsburgh Station to Mr. Paul. He will have immediate charge of the Experimental Mine work and other coal mining investigations, except the coal waste inquiry for the U. S. Coal Commission, which work will be handled directly by Mr. Paul.

M. van Sicken, Assistant to the Chief Mining Engineer, will continue in that position and act as executive officer for the Mining Division, consulting on technical matters with the Acting Chief Mining Engineer. He will also act in the capacity of District Mining Supervisor in leasing matters, except petroleum, on Indian lands, and will maintain contact with the Commissioner of Indian Affairs on all Indian mineral leasing matters, consulting with H. I. Smith on coal leasing technical matters.

H. I. Smith will continue as Mining Supervisor and will report through the Assistant to the Chief Mining Engineer on administrative matters, consulting with the Acting Chief Mining Engineer on technical matters.

S. P. Howell, after July 1, will be detailed to the field investigation of liquid oxygen explosives under the new appropriation. J. E. Crawshaw will continue to serve as acting head of the Explosives Section and report through the Superintendent of the Pittsburgh Station to the office of the Chief Mining Engineer.

The Kickapoo Sand and Gravel Co., of Peru, Indiana, has increased its capital stock from \$20,000 to \$50,000.

## Canadian Company Reorganized

The Toronto Cement Corporation Limited has been incorporated with a capitalization of \$3,000,000, and has taken over the buildings, machinery, properties and assets of the Ontario Cement Company Ltd., of Brantford, Ontario.

The officers of the company are:  
A. J. Young, president.  
Col. J. Z. Fraser, vice president.  
A. M. Harley, secretary.  
C. A. Patterson, treasurer.  
H. C. Shields, chief engineer.  
Geo. McCrae, resident engineer.

The executive offices of the company are at 506 C. P. R. Building, Toronto, Ontario.

The new corporation will continue and complete the work started by the Ontario Cement Company Limited, on its property at Beachville, Ontario.

All the buildings are planned for an ultimate capacity of 4,500 barrels of cement per day, and plans are now being completed for the installation of the first unit, of 1,500 barrels per day.

One 11 by 200-foot rotary kiln will be installed, together with the necessary raw and clinker grinding machinery. The new kiln building, fuel mill and cement stack house are practically completed. In addition to these buildings, a new raw material storage building is being planned, 570 feet long and 80 feet wide, together with raw and clinker grinding building, blacksmith shop, machine shop, oil house and store house. The coal, gypsum, clinker, limestone and clay will all be housed in the new storage building, and will be served by two high-speed, 15-ton, electrically operated overhead cranes.

The plant is located on the main line of the Canadian National Railway, between Woodstock and Ingersoll, and connections will be made with the Canadian Pacific Railway which is directly south of the property. The Provincial Highway parallels the property, and it is proposed to use large capacity trucks and trailers for cement shipments within certain distances of the plant.

The United States Gypsum Co., of Chicago, Ill., has declared its regular quarterly dividend of 1 per cent on the common and 1½ per cent on the preferred stocks.

## Death of O. A. White

Oscar A. White, advertising manager for Fate-Root-Heath Company, Plymouth, Ohio, died at his home in Plymouth, April 22. Mr. White was well known among the trade, and will be especially remembered for his stirring address before the convention of the National Crushed Stone Association in 1922.

He was born at Salamonia, Jay County, Indiana, November 21, 1860. He graduated from Lebanon (Ohio) College in 1879, and was principal of Ridgeville (Ind.) High School for several years.

In 1879 he married Anna Andersen, who, with one daughter, survive him.

He studied law, and was admitted to the Indiana Bar in 1893.

Newspaper work always appealed to him and at different times he was the owner or editor of publications at Ridgeville, Ind., Mt. Gilead, Ohio, Greenfield, Ohio, and Plymouth, Ohio.

From 1908 to 1912 he was the Chicago manager for the American Press Association.

In 1920 he became advertising manager for the Fate-Root-Heath Company, Plymouth, Ohio, which position he held until the time of his death.

In addition to his literary attainments, Mr. White was renowned as an orator of exceptional ability.

He was a member of the Methodist Church, and active in all community affairs. He was beloved by all who knew him for his unimpeachable character, wise counsel and staunch friendship.

Notice has recently been received of the removal of the Link-Belt Company's Pittsburgh branch office from their old quarters at 1501 Park Building to their new and more commodious offices at 335 Fifth Avenue. Mr. T. F. Webster, manager of the Pittsburgh office, says that large space and the more convenient location was imperative because of the extraordinary volume of business transacted during the past year and which promises to remain in full swing at least for the coming fiscal year.

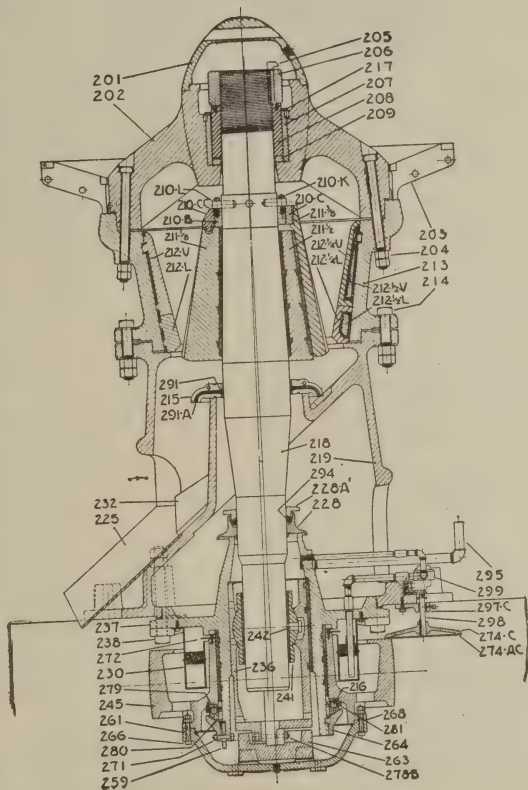
The Gypsum Industries moved the office on the first of May, from 44 Conway Bldg., to the seventh floor of the American Fore Building, 844 Rush Street, Chicago, Illinois.



# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.



Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

**KENNEDY VAN SAUN MFG. & ENGR. CORP.**  
 50 Church St. NEW YORK

CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS

## Cuts Out Three Fans

The new improved form of gelatin recently placed on the market by the Atlas Powder Company is reported from all sections where it has been used as giving extraordinary results, not only in its all-around efficiency as an explosive, but in respect to the negligible amount of fumes evolved.

One foreman advises that his men are strong for the new gelatin as they have cut down on the number of sticks to the hole and cut out three fans as gas don't bother at all.

Another, a resident engineer on a large tunnel operation, reports that his men could return to work in 12 to 18 minutes, while with the old style gelatin it required at least 30 minutes before the men could return, and then they could not stay.

In addition to these advantages, the manufacturer of this new explosive advises that it is extremely high in water resistance and also practically perfect in plasticity—two properties that are of extreme importance in most underground operations, where wet work is often encountered and where loading in upward or pitching holes is necessary so frequently.

## Two Westinghouse Publications

The Westinghouse Electric & Manufacturing Company recently issued Leaflet 2390-A, describing the Type E, engine-driven alternating-current generators. In this leaflet the construction of these generators from 50 to 3,000 kv-a. is illustrated and described.

These generators are applicable to all prime movers, being suitable for direct connection to steam, gas, and oil engines, or slow speed horizontal water-wheels.

The Westinghouse Company has also issued Leaflet 3477-B, which is descriptive of the hot spot indicator for transformers. The device is illustrated with photographs and wiring diagrams showing how the indicator functions and how it is located in the transformer.

The Adamantread Co., Manhattan, N. Y., has been incorporated with a capital of \$10,000 to manufacture cements. C. R. Taylor, S. Plotnick and P. F. Wicksel. Attorney, B. H. Wicksel, 362 Fifth Avenue, New York City.

## Fluorspar In 1922

The Department of the Interior, through Hubert W. Davis of the Geological Survey, reports that the domestic fluorspar-mining industry showed considerable improvement during 1922, recovering from the severe slump of 1921. The improvement was due principally to a larger demand for fluorspar of fluxing grade in the steel industry, which took about 86 per cent of the mineral shipped in 1922.

The producers of about 70 per cent of the basic open-hearth steel made reported that they consumed 72,962 short tons of fluorspar in 1922 and had stocks on hand amounting to 45,637 short tons on January 1, 1923. If the steel companies which did not report consumed a like proportion of fluorspar, the figures given indicate a total consumption in all steel plants of about 104,000 tons in 1922 and total stocks of about 65,000 tons on hand January 1, 1923.

## Heil Anniversary

The Heil Company, Milwaukee, observed its twenty-second anniversary in May.

Conditions have changed in many ways since 1901. The products originally built have also changed. In 1912 the Heil Co. built the first steel dump body for the present Sterling Motor Truck Co. The Heil Co., originator for this class of equipment, have steadily grown and developed this line until today the company stands foremost in the manufacture of dump bodies and hoists for motor trucks.

In 1919 the Heil Co. took over the Hydro Hoist Co., the first successful manufacturer of underbody hydraulic hoists for motor trucks. The Hydro Hoist has proved to be the first practical underbody hoist. It is the real pioneer in the underbody hydraulic hoist field and has been widely adopted by leading motor truck manufacturers.

The United States Slate Co., Pen Argyl, Pa., has resumed operations at its local quarry and plans for extensive production. A large working force will be employed. It is expected to keep the plant on the active list for an indefinite period.



# *Move More Material at Less Cost*



Western Dump Cars—Dumped Position.

Your dump car installation is an important factor in quantity production and the consequent lowering of cost. You are urged to study the performance of Western dump cars in Pit and Quarry work. Let us refer you to the Western installation nearest your plant.

Western dump cars are famous for their dependability—great production and small cost of maintenance.

Tell us your haulage problems—haulage is our specialty. Perhaps we can help.

**Western**

*That's  
Why*

## **Western Wheeled Scraper Company**

**Earth and Stone Handling Machinery**

**1400 Farnsworth Avenue**

**AURORA, ILLINOIS**

## Self-Dumping Body

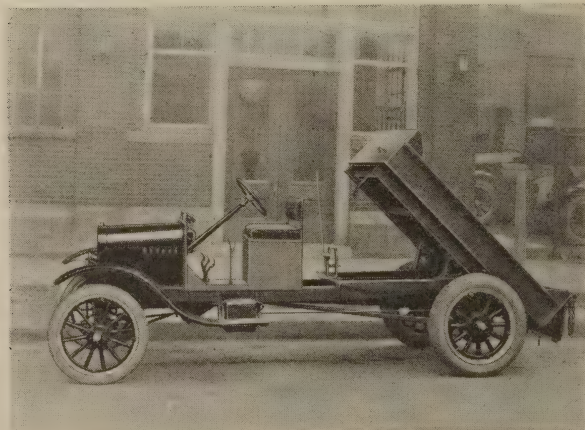
The Wood Hydraulic Hoist and Body Co. of Detroit are building for use on the Ford truck an interesting self-dumping steel body unit. The body is constructed entirely of steel and of the same general design as the many thousands of steel dump bodies which the Wood company has supplied for use on the heavier types of trucks.

The body, with its mounting frame, hinges and locking device, is a complete unit ready for placing on the truck frame.

The hinges on which the body tilts are of ingenious design embodying two hinge pins or fulcrums. The two fulcrum points have a definite effect to displace the center of the loaded body towards the rear, while dumping, assuring quick action and obtaining a high dumping angle to discharge the body contents.

The body is returned to the down and locked position by a handle attached to the front of the body; only a slight effort is required as the body when empty is in a balanced condition. The releasing handle is arranged for convenient operation by the driver, and positively locks the body against accidental operation when truck is in rough going. The body has a "three point support," a very desirable feature, which prevents body being effected by weaving or twisting of the truck frame.

The tail gate opens and closes automatically, requiring no attention from the driver.



Self-dumping body for Ford truck

## Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,451,803. Locking device for power-shovels. Edwin J. Armstrong, Erie, Pa.

1,452,154. Rotation release for rock-drills. Charles C. Hansen, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,452,218. Pulverizing-mill. Ralph E. H. Pomeroy, Canton, Ohio.

1,452,581. Rock-drill. Clarence R. Welch, Denver, Colo.

1,452,734. Rock-drill. Gustav Griesche, Berkeley, Cal.

1,453,540. Bucket. Fitch H. and Fred S. Beach, Charlotte, Mich.

1,453,805. Dipper-tooth. Wesley G. Nichols, Chicago Heights, Ill., assignor to American Manganese Steel Co., Chicago, Ill.

1,453,813. Dipper-front. Ellison E. Vanderhoef, Jerome, Ariz., assignor to American Manganese Steel Co., Chicago, Ill.

1,453,927. Grab-bucket. Warren J. Eaton, Midland, Pa.

1,454,032. Excavator front-end construction. Svante R. W. M. Bager, Werner Lehman, and Frederick C. Ruhloff, South Milwaukee, Wis., assignors to Bucyrus Co., same place.

1,454,140. Separating machine. Thomas J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Co., Boston, Mass.

1,454,486. Bucket-lifter. John W. Plant, San Mateo, Cal., assignor to American Manganese Steel Co., Chicago, Ill.

1,454,781. Excavating machine. Roy E. Wilcox, Arcanum, Ohio.

1,455,553. Motor rotation for rock-drills. Fred M. Slater, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7

CHICAGO, ILL., JULY, 1923

NO. 10

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**J. J. FITZGERALD, Associate Editor**



*One of the Barber-Greene Conveyors whose work is described on this page.  
The photograph in the corner shows a Barber-Greene Bucket Loader loading trucks.*

## Increasing washed and screened gravel production 350 tons per day

By replacing a bucket elevator system with two Barber-Greene conveyors the White Marsh Sand and Gravel Company near Baltimore jumped up its production of washed and screened gravel from 50 tons a day to 400 tons.

And there have been no repairs since last July.

Two Barber-Greenes are used. One is a 96-foot permanent unit on which a 15 horse-power LeRoi engine drives the belt and 36 in. x 48 in. rotary screen.

The other is a 22-foot Portable and is used to load trucks from a ground storage pile. In another plant this company has a similar Barber-Greene installation. The gravel handled is washed and screened and carried to bins or to a storage pile across the railroad track shown in the photograph reproduced above.

## As hot weather reduces production

Because of high wages and keen demand the influence of warm weather in cutting down production will be more important than it has been for some years. The use of good conveyor installations that will make plants as independent of men as possible, will therefore be even more profitable than usual. Even more than in other years, Barber-Greene installations in sand and gravel plants are increasing as the hot weather approaches. Men are scarcer than usual and the demand for production in many regions is stronger than usual. Because of their flexibility and low repair cost, Barber-Greenes are therefore in even greater demand than usual for handling sand and gravel.

This increased use includes both large and small plants—and both primary and supplementary equipment.

Some recent installations handle the entire production of plants with Barber-Greene Bucket Loaders and Portable Conveyors.

In other cases, as in the one described above, the Barber-Greenes are supplementary equipment handling only part of the output.

For additional information about Barber-Greene Loaders and Portable Conveyors, and how they are being used to make up for the shortage and high cost of labor, send for our N cost reports and catalog.

Barber-Greene Company, 490 W. Park Avenue, Aurora, Illinois  
Representatives in thirty-three cities

**BARBER GREENE**  
Portable Belt Conveyors      Self Feeding Bucket Loaders

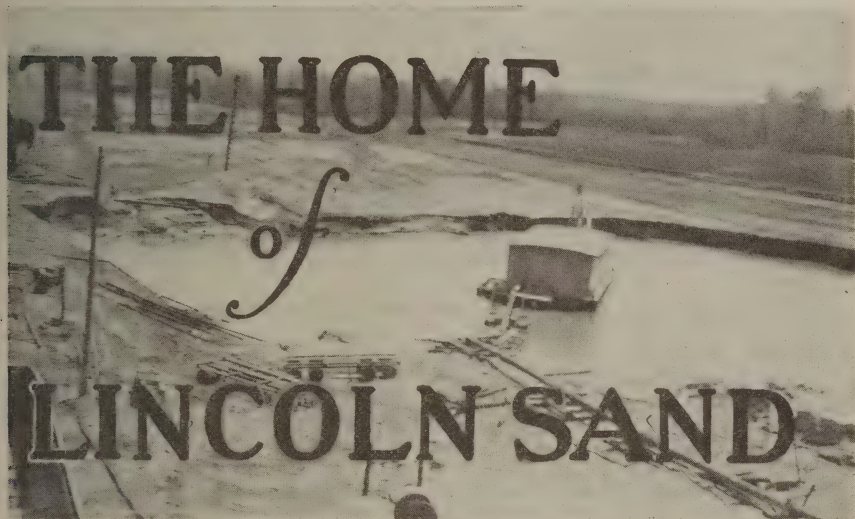


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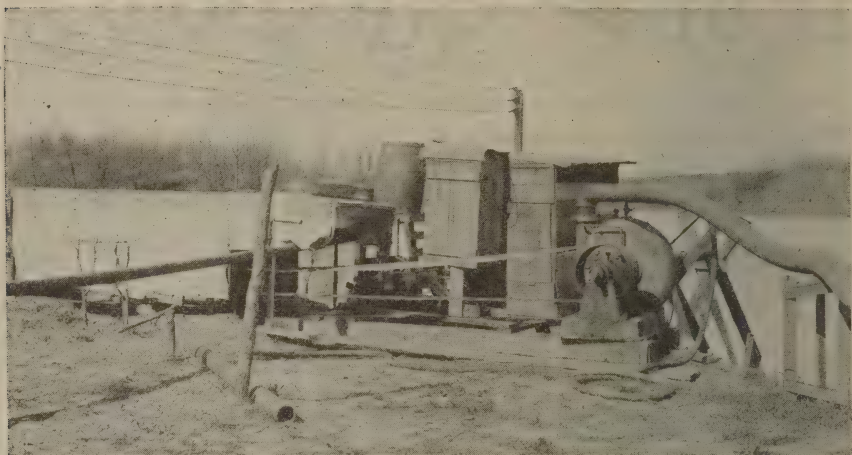
For a number of years gravel and sand have been excavated from the property on which is now located the dredging operation of the Lincoln Sand and Gravel Company, Lincoln, Ill. This concern has, in fact, exerted a very appreciable influence upon the topographic character of the land on which the work is being conducted. They have made lakes and hills and hollows in the flat prairie country enclosed by their deposit and have removed a great amount of material for the highway and building activities of the section.

In Lincoln, named for the great Emancipator who practiced law here in his early days, is located the home office of the company. Here Mr. J. C. Brandt and "Buck" Weaver hold forth and lay plans to start more and more cars labeled with the familiar yellow signs, "Lincoln Sand" and "Lincoln Gravel," rolling in the direction of various jobs in their territory. That they do their work well is evidenced by the number of cars they keep rolling and by the number of those yellow signs that the purchasing agent has to provide. The signs by the way,

are worthy of note. The distinguish the cars of Lincoln material in a train and undoubtedly result in an amount of desirable advertising.

Besides its use as a center of the company's sales activities, the home office also serves the purpose of an objective for the occasional flying trips of the president of the company, Mr. V. O. Johnston. They do say that Mr. Johnston's trips are very much of the occasional and the flying variety. But any sand or gravel producer who is a member of the National Sand and Gravel Association knows how much Mr. Johnston can accomplish on a trip, no matter how occasional or how flying.

But we were talking about signs. These signs are of light sheet metal, enameled. On one side they carry the legend, "Lincoln Sand," on the other "Lincoln Gravel." The sign is tacked to a lath which is stuck into the material, making an "ad" visible from all directions. Nothing new about the idea, but it is in our opinion a move in the right direction. If more producers would take the trouble to provide some such means of publicity



Water is supplied by another pumping unit.

for their products, those products would be better known to many potential customers.

The plant itself is located about 4 miles out of Lincoln, to which town it is connected by the company's right-of-way. Between Lincoln and the plant the company maintains a standard gauge railroad system along which they convey with their own locomotives all materials handled at the plant. This entails the necessity of keeping in repair over 7 miles of railroad track, but the expense of doing this is balanced by the economy and convenience that come with improved railroad facilities. A section gang is permanently employed at keeping the right-of-way in good condition.

At the plant you meet Mr. H. E. Clouse, superintendent, who is there to tell you that the plant is ready at any time to back up the company's slogan, "one car or a trainload." Mr. Clouse is pretty busy these days getting the new dredging equipment in most efficient working order and maintaining harmony between this new dredging equipment and the washing and screening plant, erected before the improved excavating means were provided.

Operations have just been started on a part of the property which has, up to this time, been untouched. On this part enough ground has been stripped to insure a year's operation. On other parts of the company's 360

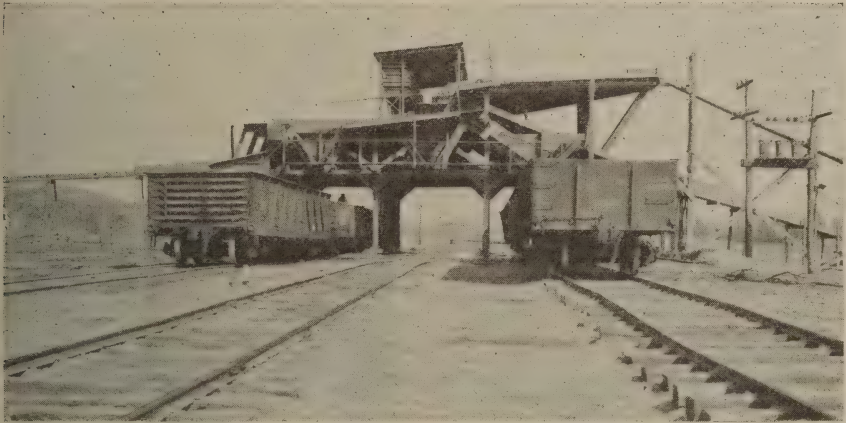
acres are places where excavating has been carried on extensively in the past. These three working places are connected in such a way as to form a single lake.

At the point where the present excavation is being carried on, there was a light overburden which was stripped off by a contractor. In the deposit is plenty of good material running about 75 per cent sand and good down to a depth of about 50 feet. The material is fairly compact and contains an amount of large stones which, while not sufficient in number to justify the installation of crushing equipment, are still sufficient to present an occasional problem to the pump operator. Under the desirable material is a ledge of lime rock. At the present time the dredge is working at a depth of 18 feet.

The dredge is 40 feet long, 20 feet wide, and draws 18 inches of water. It is well built and calked and should prove satisfactory in operation. All equipment on it is operated by electric motors, the electric current transmitted through a submarine cable from the point at which the company receives power from the local central station.

On the dredge is located the transformers necessary to step down the current from 2,200 volts to 220 volts. This section of the dredge is very carefully caged in to reduce the hazards that accompany working around this kind of equipment.





Side view of washing and screening plant.

The dredge is sufficiently roomy to allow freedom of action for the operators. Unique with the dredge construction is the careful study of the plant layout, and the placing of machinery. Centralized controls minimize unnecessary moves on the part of the operator and he can clearly see forward to the operation of the suction line. There is secured a proper distribution of weight with proper location of the center of gravity in relation to the dredge boat as a whole, giving good buoyancy and balancing effect. When a little time and forethought are given to this subject, benefits are derived in time to come because of the fact that the dredge is very easily handled under all operating conditions. One of the essential features to be given due consideration is that one does not have to step over, about and around fittings any more than necessary. The comfort of the operators is also kept in mind in other ways, for the boat is electrically lighted and provided with a telephone and other similar conveniences.

The craft and the mounting of the machinery located on it, are entirely the work of the company's own men.

Last year at the end of the operating season work was begun on the construction of the new dredge, and the men were given employment during the time when their services could not otherwise have been used. As a consequence, they know the equipment very well, because they were personally identified with the building of it. Since there is very

little labor turnover at the Lincoln Sand and Gravel Company, there is a great advantage in this plan of having the men build the equipment with which they will work. The men who are actually working on the dredge are familiar with the smallest details of construction. The other men about the plant who are not actually employed on the dredge are, nevertheless, because of their familiarity with the excavating equipment, of greater use to the company.

Mr. Clouse makes the proud claim that any of his men is willing to go from one job to another on a minute's notice. Every man is, in a way a utility man and is not so obsessed with the idea that he is hired to do certain things that he cannot bring himself to do work which he did not specifically agree to do at the time he was employed.

The "A" frame is stationary. Control of the suction nozzle is had either through movement of the boom, or of the suction line hoist cable. Control of the nozzle and boom are obtained through a 3-drum hoist made by the American Hoist and Derrick Company. One drum is used for swinging the boom, one for raising and lowering the nozzle and one for controlling the shore lines which hold the dredge in place. Spuds are not used. The hoist is operated by a controller made by the Union Electric Manufacturing Company of Milwaukee, Wisconsin.

The dredging pump is primed by a size SS2 centrifugal water pump manufactured by the Dayton-Dowd Company of Quincy, Illinois. This

pump, which also serves as a bilge pump, is driven by a 5 h.p. 220 volt, 3 phase, 60 cycle, Westinghouse motor, operating at 1,150 r.p.m.

Pontoons for the pipe line are made of steel oil barrels which have proved very satisfactory. National dredge pipe is used to carry excavated materials to a point whose height gives the pumps a maximum working lift of 30 feet. During experimental work the dredge has pumped against a lift of 50 feet, but it is expected that under actual working conditions the pumps will not be employed to work against a lift of over 30 feet.

The sand and gravel is excavated by a 10 inch Amsco heavy duty manganese steel pump, directly connected to a 250-h.p. General Electric motor of slip ring construction, provided with resistance grids, permitting of 50 per cent speed variation control. The full load speed of the motor is 590 r.p.m.. A sturdy, well-designed, flexible coupling is employed, making connection between the pump and the motor. A feature of the pump construction is the main bearing layout. This bearing is of unusual length, with plenty of babbitted bearing surfaces. End thrust is cared for by the use of shaft of steamship propeller shaft construction having 4 flanged collars, forged integrally with the shaft. These bear against babbitted surfaces of an independent thrust housing for impeller adjustment in relation to the center line of the shell. A large screw bolt held in the bearing pedestal, engaged with fingers cast integrally with the bearing carriage, permits of easily and positively caring for pump alignment. One feature of this bearing is that parts can be easily and quickly removed, repaired and replaced.

This plant is designed to work at about a maximum radius of from 1,000 to 1,300 feet. Radius is commonly referred to as the horizontal distance from the front end of the dredge to the shore plant position.

After material is pumped to the end of the pipe line and is introduced into the plant process, its movement is controlled entirely by gravity. The plant of the Lincoln Sand and Gravel Company is of a type that appears to be the particular property of this section of the country. Mr. V. O. Johnston is a pioneer in the operation of a plant of this design.

The work is done without power.



Little Giant Crane to be used on stock pile.

The material spreads out first on an inclined, fan-shaped table, along which it is carried by the water to stationary screens set at 45 degrees to the horizontal. These screens take the large sizes and pass them to bins, allowing the fines to go ahead to wooden settling bins. Before entering the settling bins, the sand and water are passed over a series of wooden baffles which separate the coarser material, permitting the water and fine sand to go ahead.

The waste water, after it has been utilized in the washing process, overflows from the last settling bin into a flume at the end of the plant, along which it is carried to another flume that is built out to the old workings. The tail water is thus kept away from the lake where excavation is being carried on. Water that is taken out earlier in the process and which contains the heavier material is spouted back into the places where excavation is being done.

At the receiving end of the plant, provision is made for dropping the oversize stone into a bin, from which it is drawn off to fill occasional orders for such material.

During the operating season they will attempt to build up a stock pile to serve the needs of their trade during the months when the plant is not in operation. The building of this stock pile and the work of reclaiming from it will be handled by a Little Giant crane, made by the Locomotive Crane Company of America.



## California Opposes State Cement Plant

**I**N CALIFORNIA we have the spectacle of the representatives of the people trying to put over something which the people themselves do not want. All expressions of local papers which have come to this office have been in opposition to the plan. Under the heading "Whither Does It Lead?" the Colton Courier says:

The senate of the state of California passed a bill making it legally possible for the State of California to enter into the manufacture of cement. Then the appropriation committee turned around and killed the bill by cutting off any appropriation for its operation. The net result of the whole thing is that a few senators have annoyed investors who have millions upon millions invested in this state for the sake of making a pitiable play for the labor vote.

The bill, it is acknowledged, was fostered by the federation of labor because the members of this federation claim cement companies are consistently non-union. That is obviously a matter for settlement between cement companies and their employes and is strictly no business of the state of California unless we change our state and federal constitution. Why then, this play of petty politics? Whither will it lead?

In the first place the state should, in our opinion, enter private manufacturing business only under stress of a great emergency. During the late war, the government very properly took over some industries in the emergency that then existed. Although we are still paying the bill of extravagance and waste, the emergency justified the move. But no such emergency exists or is in prospect in the state of California. Cement companies are furnishing material at a price that is admittedly far beyond competition on the part of the state or small corporations. These companies have never been accused of boosting prices beyond a reasonable margin of profit, have never shown any disposition to manufacture anything other than high grade material. In fact the cement companies have, at times, been almost alone in their fight for strict supervision of highways, for

abolishment of political pull in appointment of inspectors of roads and have openly campaigned for such specifications in road building as will give the taxpayers a splendid highway. We believe the cement manufacturing plants of the state have a record of no little merit in this respect and have been given little or no credit for their efforts.

So, we feel, there is no condition existing anywhere in the state that would, in the least, justify such a radical move as the opening of a cement plant by the state.

Whither would it lead if we were to build such a plant? Would not there be just as logical a reason for opening railroad shops at the demand of dissatisfied workmen? Would it not be as reasonable to have the state take over a newspaper where such a newspaper is openly antagonizing certain labor elements? Surely men elected to make laws for the state can see where such a course would lead them. Any sensible corporation knows that efficiency is reached only when relations between employer and employe are pleasant but if this condition does not exist it is not up to the state to act.

The business of law making is a serious business. We do not believe this is a time for a play of politics but rather for serious consideration of needed legislation.

The San Bernardino Sun is another paper which opposes the plan, saying in the heading to its editorial that it wants "No North Dakota Policies." The editorial follows:

We would be willing to see almost anything done to break the combination that controls the price of cement, in California and elsewhere—that is anything short of following the example set by North Dakota, whose disastrous experiments in State ownership of banks and industries is not likely to be lost on the American public.

But there must be ways of dealing with the cement combination aside from going into competition with it. Both the State and the nation has anti-trust laws which forbid and threaten punishment for just the sort of combination that the cement makers of the land are presumed to be in. This is done so openly that they hardly take the trouble to deny it. Cement from

all mills is sold at the same price in Los Angeles, and the consumer can buy Colton or Victor cement cheaper in Los Angeles than in San Bernardino. Which ought not to be. The theory is that it is sold there on a delivered price, but consumers a few miles from the plant need not go to Los Angeles to get it.

But for all that, we pause at the suggestion in danger of becoming a law at Sacramento, which would appropriate \$750,000 to start State-owned cement plants. The spectre of the North Dakota bank and elevator smash proves there are other things at least as bad as trade combinations. Besides, if half we hear from Sacramento is true, the State has no money to put into cement plants. It might spend less and "bust the trust."

## Buy Cement By the Sack

It seems superfluous to speak about buying cement by the sack when, for many years, all of your cement has come to you in sacks, if you do not buy it in bulk. But through those years you have paid for it on the basis of a barrel containing four sacks. The customer is a holdover from early times, when barrels were actually used; and all quotations have been made on that basis, even long after no cement barrels were to be found on any job. One manufacturer, Marquette, has at last decided to do away with this anomalous situation and will hereafter quote prices on the basis of the sales unit involved. The cement buyer might well suggest that other manufacturers pull into line in the interest of less confusion. You use cement by the sack; then why not buy it by the sack and pay for it by the sack? Propose it to the next salesman who comes your way.

—*American Contractor.*

The Universal Gypsum Co., Rotan, Texas, has been incorporated with a capital stock of \$100,000. The incorporators are, C. E. Williams, L. Ford and J. V. Gray.

W. C. MacDowell, formerly manager mining sales department, Power and Mining Machinery Works of the Worthington Pump and Machinery Corp., has accepted the position of general sales manager of the Traylor Engineering Company, Allentown, Pa.

## No Gravel Monopoly

### Decision Says Buffalo Gravel Corporation is Not in Restraint of Trade

No monopoly exists in Buffalo in the production and sale of river sand, grit and gravel, according to the verdict rendered June 6 by the Supreme Court jury which for eight days had been hearing evidence on the alleged violation of the State Anti-Trust law by five corporations and three individuals. After deliberating four hours the jurors reported a verdict of not guilty in favor of each defendant.

It was the initial trial on indictments arising from the investigation by the Lockwood Housing Committee in June, 1921. There are pending indictments on a similar charge involving nearly 100 individuals and corporations engaged in the lumber, brick and mason supplies business.

The companies thus vindicated are: The Buffalo Gravel Corporation, the selling agency, and its subsidiaries, the Perry-Victoria Sand & Gravel Co., the Empire Limestone Co., the Niagara Sand & Gravel Co., the Niagara Sand Co., and the Squaw Island Sand & Gravel Corp.

The individuals whose names were cleared are: Samuel J. Dark, Daniel E. Knowlton and James E. Carroll, each of whom is president of one of the subsidiary companies and a director of the Buffalo Gravel Corporation.

The defendants were charged with creating a monopoly in the sand and gravel business in the Buffalo district in that the Perry-Victoria, Empire Limestone, Squaw Island and Niagara Sand companies in 1919 drew up a contract under which the Buffalo Gravel Corporation was organized as the selling company for all the others, which were to do nothing but produce sand, grit and gravel, and agreed to sell to no other company except the Buffalo Gravel Corporation. The Holloway Sand Company, which was the only other company engaged in this line here, was not included in the combination.

The defense claimed that this combination was effected at the behest of the war industries board and denied that it restrained trade or constituted a monopoly. It was asserted that the



unification was made as a means of meeting the increase in labor and costs by pooling boats, yards and truck fleets, and voluminous evidence was introduced to show that service had vastly improved under the combination. Strenuous attempts were made to get into the record evidence to substantiate the claim of the defense that the Buffalo Gravel Corporation sells gravel cheaper than any other company in the country, but the court would not permit comparative prices to be given. The defense, however, was successful in introducing evidence to show that the Buffalo Gravel Corporation sold gravel cheaper than any other company in this district.

The verdict seems to have the approval of the people as expressed through the Buffalo newspapers. The Buffalo Commercial says editorially:

"The jury that freed the individuals and corporations charged with violating the Donnelly anti-monopoly law by entering into a contract whereby they controlled a substantial amount of the sand, grit and gravel taken from the Niagara river and carrying that contract out by doing acts in furtherance of it must have been impressed with these claims of the defense:

"That the contract was entered into in accordance with the advice and direction of the War Industries Board, which at a conference of sand and gravel producers held in Washington advanced the idea of consolidating the efforts of the producers to achieve economies to conserve the strength of the country.

"That the prices charged by the Buffalo Gravel Corporation were apparently fair with an excellent service to the consumers.

"That although sand, grit and gravel are essential commodities in the building industry there are other competing materials such as crushed stone, crushed slag and pit gravel.

"That there is an almost limitless supply of sand and gravel in the river and the lake which can be taken by anybody who sees fit to compete with the Buffalo Gravel Corporation.

"The prosecution proved, and it was conceded by the defense, that the defendants controlled 80 per cent of the sand, grit and gravel taken from Niagara river, and the law only requires the people to prove that such combi-

nation as the Buffalo Gravel Corporation represented was in a position to control a substantial amount of the essential commodity or commodities and to fix prices.

"Another thing too that probably had weight with the jury was the character of the individual defendants—their high standing in the community, their apparent honesty of effort and fairness. These were almost insurmountable obstacles for the prosecution."

The editor of the Buffalo Times is even more outspoken, saying:

"The acquittal of eight defendants in the now famous sand and gravel case in which five defendant companies and three individuals were charged with combination in violation of the State anti-trust laws, is sequel to the Lockwood activity of nearly two years ago.

"The public is well satisfied with the acquittal. The defendants are all reputable business men legitimately engaged. While it was shown that the combination existed it was claimed for it that it was formed to reduce costs of production and not for purposes of gouging the public, a contention that was well substantiated by unimpeachable testimony. Moreover it was shown that the combination as formed was passed as legal by a competent attorney and that the individual members entered it without a suspicion that it transgressed the law.

"While acquittal on these grounds may not square entirely with the law, as was pointed out by Judge North in his charge to the jury yesterday, it does square with common sense, which is the tape by which the honest layman measures right and wrong.

"What protection is there or can there be for the honest business man who follows the letter of his attorney's advice and still encounters trouble? True, this course might lead to great abuse. Unscrupulous men might easily engage unscrupulous attorneys to give them whatever advice fitted their nefarious schemes. The character of defendants and of the attorney should then form the basis of a jury's deliberations. In this case the defendants were business men of high standing and the attorney a respected member of the bar.

"In the circumstances the destruction of valuable property, and the blighting of character of unquestion-

ably good intent, would have distorted justice distressingly."

Testimony was unanimous in showing that the service given by the Buffalo Gravel Corporation was better than that formerly given by its subsidiaries. It was also shown that the corporation extended the helping hand to the Holloway Sand Company, its lone competitor, and was instrumental in enabling this company to weather financial storms after it changed hands in 1919, according to the testimony of Wallace Turbervill, president of the Holloway Company.

He declared that there had been no unfair competition engaged in by the Buffalo Gravel Corporation, that the company had once loaned equipment to the Holloway Sand Company and had sent its big tug out to pull the Holloway boat off shoals upon which it was stranded.

Among other evidences of friendly co-operation, the witness testified that the Holloway Company had been able to remain in business in 1919, because the Buffalo Gravel Corporation had taken care of some of the Holloway customers and had extended credit to the Holloway Company for six months. Mr. Turbervill said that the Holloway Company was in poor condition when he and some associates bought control of it in 1919 and while they were rehabilitating the company, they were given great assistance by the combination.

Frank X. Ernst, assistant treasurer, was examined relative to holding some gravel yards in reserve, after the combination was effected. He said this made possible great savings in coal, oil and labor.

Ernst testified about the business of the corporation. In 1919, he said, 265,000 cubic yards of sand and gravel were sold in Buffalo and 222,000 outside of Buffalo. Total sales in 1920 increased to 283,000 cubic yards in Buffalo and 292,000 outside of Buffalo, Ernst testified.

John E. Johnson, general contractor, who does heavy construction work such as grade crossings, etc., called as a witness, asserted that the organization of the Buffalo Gravel Corporation had improved service, in his experience.

Attorney Killeen in summing up for the defense, pictured the formation of the Buffalo Gravel Corporation as an honest effort on the part of the men owning it to continue economies forced

upon business during the war without curtailing service. He said many of these economies were found to be good things by business men who had not employed them before the government forced them upon them to conserve the strength of the country for war purposes.

"These men should be commended not convicted for what they did," said Mr. Killeen. "This plan was beneficial to these men and to the public."

Mr. Killeen declared the price of gravel would have had to be raised 45 cents per yard if the Buffalo Gravel corporation had not been formed to achieve the big economies in eliminating the duplication of effort on the part of the four producing companies.

## To Measure Fatigue of Stone

It has long been known that a load much below its apparent breaking strength would cause failure of stone after a long time. The Bureau of Standards is now undertaking a series of tests to determine the extent of this effect and to see how much load can safely be borne by stone for indefinite periods.

Samples of stone will be tested both in straight compression and in bending. Loads will be put on and left there, and the deflection of the stone will be measured from time to time.

Marble has the peculiar quality of sagging slowly, even under its own weight. Thus many cases are known in which marble slabs placed in horizontal position for a hundred years or so have sagged down several inches, and thin tombstones of marble have bent over.

## China to Produce Cement

China is to meet her own demands for cement. According to a report from Consul J. K. Daves, Nanking, a new plant is being erected in the Yangtze Valley. This plant, midway between the two greatest markets of China, will have an initial output of four hundred 375-lb. barrels per day. The China Cement Manufacturing Co., the first to produce in this vicinity, has invested approximately \$380,000 in the enterprise.

With the completion of this plant, which is to begin operations soon, and of another in Shanghai, China's demands for cement will be met by domestic production to a large extent.



# Production of Stone in 1922

The stone produced in the United States in 1922 amounted to about 81,000,000 short tons, valued at \$118,500,000, according to an estimate given out by the Department of the Interior from figures compiled by the Geological Survey. These figures show an increase of about 27 per cent in quantity and 11 per cent in value over the output in 1921. There was a good demand during the year for nearly all kinds of stone but the production of monumental and building stone, paving blocks, curbstone, and flagstone was somewhat restricted by labor troubles, which caused the closing of quarries and cutting plants, especially at the principal granite centers in the New England States. Trouble was also experienced in getting transportation for crushed stone and other stone products. The cost of quarrying was somewhat less in 1922 than in 1921, and prices were lower.

Building stone was in good demand, as is shown by an increase of 81 per cent in the output of limestone from the Bedford-Bloomington district, in Lawrence and Monroe counties, Indiana. This large increase was not shown throughout the country, but increases in other districts, in limestone, sandstone, and marble, and to a less extent in granite used as building stone indicated an output of 23,000,000 cubic feet—a total increase in 1922 of 35 per cent.

The stone sold for manumental work

was apparently about the same as in 1921, but there was a decrease in the output of granite and an increase in that of marble.

Granite for paving blocks decreased about 20 per cent in quantity in 1922 as compared with 1921.

There was an increase in quantity of stone sold for curbstone, flagstone, and rubble, but a decrease in the quantity of that used for riprap.

The production of crushed stone, which represents over 50 per cent of the stone quarried, was estimated at 52,600,000 short tons in 1922, an increase of about 22 per cent. Crushed stone sold for use in road metal and in all kinds of concrete work increased about 24 per cent and stone sold for railroad ballast about 13 per cent.

The revival in 1922 of the metal-smelting industry increased the demand for stone for use as flux over 74 per cent. The estimated quantity of stone used for this purpose in 1922 was 18,595,000 short tons.

The stone sold for use as refractory material also increased in 1922 as did the stone, chiefly limestone, sold for use in the chemical industries.

The quantity of pulverized limestone sold for use in liming farm land was estimated at 1,180,000 short tons, a decrease of 10 per cent from 1921. The accompanying table shows the estimated output in 1922, and the totals in 1921, for comparison.

STONE SOLD IN THE UNITED STATES IN 1921 AND 1922

| Use   | 1921       |               | Estimate for 1922 |               |
|---|------------|---------------|-------------------|---------------|
|   | Quantity   | Value         | Quantity          | Value         |
| Building stone, cubic feet.....   | 17,006,210 | \$18,975,819  | 23,000,000        | \$22,000,000  |
| Approx. equivalent in short tons...                                     | 1,368,650  |               | 1,850,000         |               |
| Monumental stone, cubic feet.....                                       | 2,772,000  | 10,353,105    | 2,780,000         | 9,800,000     |
| Approx. equivalent in short tons...                                     | 230,000    |               | 230,000           |               |
| Paving blocks, number.....  | 41,588,860 | 3,593,373     | 33,000,000        | 2,650,000     |
| Approx. equivalent in short tons...                                     | 453,130    |               | 360,000           |               |
| Curbing, cubic feet.....  | 2,255,770  | 1,859,926     | 2,500,000         | 2,000,000     |
| Approx. equivalent in short tons...                                     | 183,600    |               | 200,000           |               |
| Flagging, cubic feet.....   | 791,660    | 471,837       | 800,000           | 480,000       |
| Approx. equivalent in short tons...                                     | 65,100     |               | 65,000            |               |
| Rubble, short tons.....   | 445,210    | 601,208       | 500,000           | 650,000       |
| Riprap, short tons.....   | 1,813,590  | 1,694,206     | 1,000,000         | 900,000       |
| Crushed stone, short tons.....  | 43,202,840 | 51,717,478    | 52,600,000        | 58,000,000    |
| Furnace flux (limestone and marble), long ton .....                     | 9,525,900  | 9,457,946     | 16,600,000        | 13,800,000    |
| Equivalent in short tons.....   | 10,669,000 |               | 18,595,000        |               |
| Refractory stone (ganister, mica schist, and dolomite), short tons..... | 496,150    | 643,638       | 600,000           | 720,000       |
| Manufacturing industries (limestone and marble), short tons.....        | 2,883,090  | 3,801,162     | 5,000,000         | 7,500,000     |
| Other uses .....  | *1,728,380 | *3,792,568    |                   |               |
| Total (quantities approximate, in short tons) .....                     | 63,538,740 | \$106,962,266 | 81,000,000        | \$118,500,000 |

\*Chiefly agricultural limestone.



BY VICTOR J. MILKOWSKI

A notable addition of this year to the list of sand and gravel pumping plants is the plant of the Fuller-Becker Sand and Gravel Company at Oxford Michigan, within 50 miles of Detroit, its chief market.

Until this season, the plant was operated with other means of excavation and the change was decided upon by the management after an extensive investigation of many plants, both near and far. The results obtained have been such as to leave the management highly pleased with their decision.

The dredging pumps are 15 inches in diameter suction and discharge, there being two pumps connected in series. The first pump is located on the dredge and it digs and delivers the material to the second pump, commonly called the booster pump, located on shore. This booster pump delivers the material direct to the screens.

At the present time the two pumps are delivering through a total of about 800 feet of pipe against a lift of 70 feet. This length, however, can be increased to a maximum of about 3,000 feet as the material is taken out.

The plant is electrically operated throughout, using a total of about 1,000 horse power. The current is 3 phase 60 cycle 4,600 volts on the dredging pump motors and is stepped down to 220 volts for the smaller motors.

Figure 1 at top of page shows the

general view of the plant. The dredge in the foreground digs and delivers the material through the pontoon line to the booster pump located in the building on shore. The booster pump delivers the material through the sloping pipe on trestle direct to the screens.

Figure 2 shows the interior of the dredge, while Figure 3 shows a close view of the booster house and of the booster pump. The two pumps are identical, being Morris 15-inch Heavy Duty dredging pumps, equipped with manganese steel wearing parts and directly connected to 400 horse power variable speed motors, 514 revolutions per minute.

The dredge is equipped to excavate to a depth of 35 to 40 feet below water surface. The suction is provided with a 45 degree elbow and with a special Morris jet head on the end. This jet head is equipped with 8  $\frac{3}{4}$ -inch nozzles. Water is supplied to these jets under 100 pounds pressure from a Morris 6-inch double-suction pump directly connected to a 100 horse power motor running at 1,800 revolutions per minute.

Figure 4 shows this jet head out of the water with the jets in action. The force of these jets breaks up and disintegrates the material and provides a steady, even flow of material into the pump suction. This jet head has been found to be very ef-



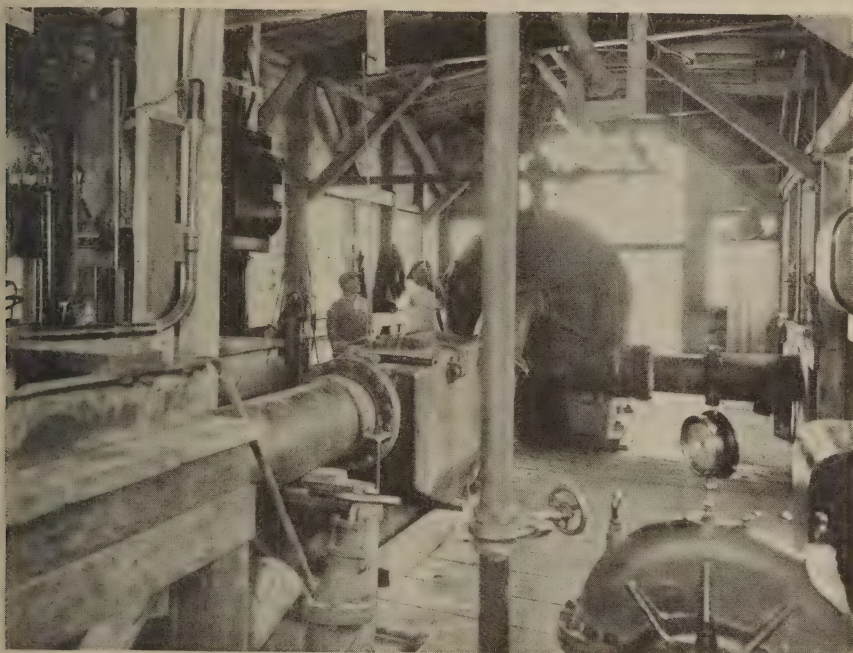


Fig. 2—Interior of dredge looking aft, showing stone box in center and 6-inch pressure pump in lower right hand corner.

fective in deposits containing seams of clay or cemented material which were too hard for the ordinary plain suction dredge.

Another special feature of this installation is the Morris stone box installed in the suction line on board the dredge. This may be seen in Figure 4 in the center. The bars in this stone box are set to catch any stone exceeding  $7\frac{1}{2}$  inches in diameter, and as the box is of considerable size it requires cleaning out but once or twice a day and prevents many shut-downs which would be occasioned by plugging of the suction.

The whole layout of the dredge is very simple and requires but one man to operate it. There are but three units on the dredge, the dredging pump, the jetting or service pump

used also for priming and a two-drum hoist, one line being for the purpose of raising and lowering the suction and the other line for holding the dredge in position. Each of these units is driven by a separate motor and the con-



Fig. 3—Booster house and booster pump.



Fig. 4—Jet head out of water and jets in action.

trols are located close together within easy reach of the operator.

The screening plant is of the conventional type with conical revolving screens, with ground storage and with a tunnel and conveyor belt underneath for loading the material into cars. Figure 5 shows the screening plant and storage compartments to the right, while the conveyor belt and the loading bin are shown to the left.

The material is first discharged into cylindrical revolving screen where the oversize is taken out and conveyed to a crusher while the balance of the material with water drops through onto a wire screen about  $\frac{3}{8}$  mesh which retains the gravel while the sand and water go through. The gravel which has been retained on the screen flows by gravity to the conical revolving screens for further separation through the wire mesh screen flow into long settling troughs where the sand is drawn off on the bottom while the waste water flows back into the pond. Three grades of coarse material and

three grades of sand are being produced at the present time.

The output is between 45 and 50 cars per day of about 10 hours operation. This can be increased considerably if desired by increasing the capacity of screens and of the crusher.

A company, said to be a subsidiary of the Illinois Glass Company, has purchased a large silica sand deposit at Millville, N. J., and will erect a plant costing a quarter of a million dollars. A long railroad spur is being built at the present time, just south of the town.

The Sandy Hill Sand Co., 155 Bond St., Paterson, N. J., has been incorporated with a capital of \$100,000.

The Genesee Stone Products Company, Batavia, N. Y., has been incorporated with a capital of \$400,000. Incorporators: A. B. and N. S. and M. H. Caldwell. Attorneys: Cook & Horton, Genesee, N. Y.



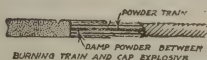
Fig. 5—Screening plant, storage, and loading bin.



# To Crimp a Blasting Cap

Did you ever consider that there is a right way and a wrong way to crimp a blasting cap on a piece of fuse?

For instance, DON'T crimp a cap on a piece of fuse the ends of which have been exposed to damp air, until you have cut off and discarded about an inch of the fuse. The powder core takes up moisture at the end and this damp powder refuses to burn, so that the spark from the powder train never reaches the explosive in the cap.



Cut off a single length of fuse at least long enough to reach 2 or 3 inches beyond the collar of the bore hole, and crimp the cap on the freshly cut end. The use of "short fuse" or "skin-'em-backs" is prohibited by law in some states. It is not only dangerous but also wasteful because you cannot tamp the hole effectively and so do not get full execution from the explosive.

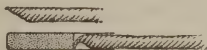
DON'T cut the fuse with a dull, dirty knife or a hatchet. It is always sure to smear some of the waterproofing in the fuse across the powder train like this!



Use a du Pont Cap Crimper to cut the fuse as it makes a straight out like this:



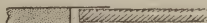
DON'T cut the fuse at an angle like this. The pointed end is likely to bend over and cause a misfire.



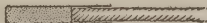
If you use a knife, keep it sharp, and clean and cut the fuse straight across as shown below:



DON'T leave an air space between the end of the fuse and the fulminate in the cap as this may prevent the spark of the fuse from igniting the fulminate in the cap.



Slip the cap over the end of the fuse until the fulminate in the cap touches the end of the fuse.



DON'T crimp the blasting cap with your teeth. Men have been killed doing this, and even if you are not killed, it does not make a good tight crimp.



Hold the cap and fuse in this position and then crimp the cap as near as possible to the open end with a du Pont Cap Crimper.



Dredge of Central Michigan Gravel Co. nearing completion.

## New Michigan Pumping Plant

A good deposit of sand and gravel in a section that affords fine market opportunities justifies the erection of a pretty fine plant and the establishment of facilities calculated to aid in the distribution of the product. This was no more true in the case of the Central Michigan Gravel Company, at Lansing, than it is in the case of any other similar enterprise; but the Central Michigan actually did what their prospects justified and now have a good plant just about at the point of beginning operations. This plant cannot be numbered among the big dredging operations, but it is in its own class worthy of consideration by operators whose conditions approximate those found at Lansing.

The deposit here runs to a depth of about 100 feet over 80 acres. It is comparatively free of impurities and showed up high in tests made by a number of laboratories. The sand content is in the neighborhood of 60 per cent and as such is representative of deposits in that section of the country. The features of the Central Michigan Company's deposit make possible the excavation of material from a bank or by dredging and these two means of securing materials will be employed when the new dredge is in operation.

At the present time all excavation is done by a Thew steam shovel equipped with a 1-yard dipper bucket. The face against which the shovel is working is some 75 feet high and 1,500 feet long.

The presence of water in considerable quantity and the desire of the company to enjoy the advantages of a pumping operation induced the officers to plan for the building of a dredge and the erection of a land plant that would convert the product of the pumps into washed and graded materials of excellent quality. The plans were brought to the point of execution by these officers under the advice of competent engineers, notable among these being Mr. Bradley Carr of the American Manganese Steel Company of Chicago Heights, Ill. At the time that the building of the dredge was begun the company was fortunate in securing the services of an experienced dredge builder who had constructed over 100 similar craft and undertook the work with the idea of building better, though not larger, than ever before. The finished job measures up to the highest expectations of the company and they believe that its operating future will be a very satisfactory and profitable one.



The dredge is 44 feet long and 20 feet wide and draws 2 feet of water. Construction is rather heavier than usual and considerable reinforcement is provided to equalize stresses brought about by the weight of the machinery at the ends. The deck space left over after the erection of the house which encloses the machinery furnishes a means of getting around the craft easily and allows space for working at the sides, should occasion for such work arise. The hull is built entirely of wood except for the iron used around corners and in similar ways.

The construction of the A frame and boom differs from that ordinarily encountered. Both are stationary, the A frame as seen from the side standing up vertically and the boom inclined forward at an angle of about 45 degrees to the deck. The boom is 26 feet long. It is supported by wire guys running from its end over the top of the A frame and by other guys running from the end to the sides of the craft at the deck. Control of the nozzle is had through cable running from a double drum Lidgerwood hoist, which also takes care of the shore lines that keep the dredge in position. No spuds are provided, the nature of the bottom on which digging is done, and the comparatively small size of the pond, making them unnecessary.

The pump, an 8-inch Amsco and built of manganese throughout, is located closer to a midship position than ordinarily; that is, farther back in the dredge. The operator, taking up his position close to this pump, has the hoist directly before him, and has the controls and instruments for all the equipment under his care close at hand. From this position he has also a clear view of the digging operation forward and can observe at all times just what is going on. Aft is located a 150-horsepower Allis-Chalmers motor of slip-ring type, operating at 720 r. p. m. on a 440-volt 60-cycle current. The drive to the pump is through a belt, the pulleys at motor and pump ends being of sizes that effect a reduction in speed.

An Allis-Chalmers pump is used for priming the dredging pump and for removing bilge water from below decks. This piece of equipment is powered by the motor above mentioned, as is also the double-drum hoist for the nozzle and the shore lines.



Front view of dredge.

Electric current will be supplied to the dredge by a line running along the pontoons supporting the discharge pipe. The current is purchased from a local central station. It is received at 44,000 volts and transformed to 440 volts on the company's property. The transformers are located on shore. Other equipment in connection with the electrical operation, aside from motor and controls, is located on the dredge in a house built above the pump.

The discharge line from the dredge to the shore plant will have a vertical lift of 45 feet. Operating at an expected working depth of 20 feet and keeping in mind that the delivery line to the plant will be comparatively short, it will be seen that the pump will not have to pump against much of a head at the beginning of operations.

The shore plant which will receive the 45 to 50-yard hourly capacity of the dredge is a simply designed one. The discharge from the pipe line is not handled by power after the point at which it enters the box above the screens. The progress of the material and the water by which it has been



Loading station at end of industrial railroad.

conveyed and washed will be controlled solely by gravity up to the time it is run into railroad cars.

At the top of the plant are located 4 Simplex screens made by the Simplex Screen Company of Salt Lake City. The surfaces of these screens are inclined in such a manner and arranged in such positions, one below the other, that the sand and gravel cascades downward over them and is thus sorted into commercial sizes. The highest screen passes material under  $2\frac{1}{2}$  inches and throws out the oversize, which may be later of sufficient quantity to justify the installation of a crusher. The second screen from the top produces  $+1$  inch —  $2\frac{1}{2}$  inch gravel, the third  $+\frac{1}{2}$  inch — 1 inch, the fourth  $+\frac{1}{4}$  inch —  $\frac{1}{2}$  inch. These several products go to bins of 20 yards capacity, each located below the screening operation.

The sand left over after the gravel sizes have been selected is passed to a sand washing tank made by the Smith Engineering Company of Milwaukee. This tank serves the purpose of cleaning and dewatering the sand and permitting its being drawn off at the bottom and sent by a chute to bins. This tank is located directly below the screens, at which point it is in a convenient position to receive the output of the last screen conveniently.

Water that is run off from the sand washing tank together with that which is eliminated earlier in the process is run into a flume along which it is conveyed to the creek from which the pond is supplied with water. In case it should become necessary at any time

to provide for clearing the tail water from the flume, this can be done very easily by running it to adjoining low ground within the company's property and allowing it to run over a small dam back to the creek, after it has been well settled.

In case the company should decide to crush the oversize material it can



Side view of plant.



do so by mounting a crusher in a space left open for such use. There is on hand a 7x12 inch jaw crusher that can be used for this purpose.

The bins are arranged to permit the loading of trucks and railroad cars from the sides. Loading will be done through bin gates made by the Newaygo Steel and Iron Co. of Newaygo, Mich. The construction below the bins is of concrete. The bins themselves are of wood.

A large part of the business of the Central Michigan Gravel Company comes from the builders in and around Lansing and a great amount of the output is consequently hauled by truck. Rail shipments in certain cases effect distinct economies, and for this reason provision is made as described for bringing cars up to the plant.

Trucks cannot be brought up so easily, for the plant is located in a rather inaccessible place, so an arrangement has been made which will considerably reduce the distance of the truck haul and keep the trucks on well paved roads. This arrangement is the company's industrial railroad, 1 mile long, which runs from the plant along a scenic route through the woods to a loading station on the outskirts of the settled section of Lansing.

Along this railroad sand and gravel is hauled by a 19-ton Baldwin locomotive in 8-yard Western air-dump cars to a series of 22 concrete loading bins. These bins are loaded at the top by dumping the cars and permit drawing off of the material at the bottom through clamshell bin gates.

The plant of the Dixie Portland Cement Co., which is being erected at Hill and River St., Chattanooga, Tenn., will manufacture roofing tile in addition to hollow tile. The plant will start production in about two weeks time, and will manufacture approximately 1,000 tile per day.

Three men were injured in a blast which was set off on May 30th, at the Leatham D. Smith stone quarry at Sturgeon Bay, Wis. The blast blew the top of the bluff into the air with such force that the stones flew in showers to the stone barge Adriatic, nearly two blocks distant.

The Barry Sand Co., has been formed at Grand Rapids, Mich., with a capital stock of \$10,000.

## A Song of Lime

They mine me and burn me,  
They crush me and churn me,  
They mix me with water,  
Hydrate me with care.

They barrel and bag me  
And label and tag me,  
Assign me to uses  
Important and rare.

They use me in concrete  
And stucco and mortar,  
They put me in plaster,  
I soften hard water.

They use me with leather,  
In rubber and glass,  
I'm plowed in the land  
I'm spread on the grass.

I neutralize acid,  
I boost the crop yield  
I'm the greatest re-agent  
In the chemical field.

I'm eternal, essential,  
And lasting as Time,  
I'm the KING of all Bases  
For I am "Burned Lime."

—Warner-American News.

## Phosphate Rock in 1922

According to the Department of the Interior, 2,417,823 tons of phosphate rock, valued at \$10,828,346, was shipped from mines in the United States during 1922, as shown by statistics collected by the Geological Survey.

Florida, the leading State, shipped 2,058,593 tons, worth \$8,347,522, more than nine-tenths of which was land-peggle phosphate. From Tennessee, 353,309 tons, worth \$2,107,382, was reported including a comparatively small quantity from Kentucky, most of which was brown rock. Small shipments were reported from Idaho and South Carolina.

The Cement Building Products Company has been incorporated at Brockton, Mass., with a capital of \$25,000. The incorporators include Howard L. Sampson of Whitman, William S. and Allan W. Barlow of Brockton.

The Waldo County Agricultural Lime Co., Lincolnville, Maine, has been incorporated with a capital of \$10,000. President, Oren W. Ripley; treasurer, Amase S. Heal; clerk, Allen H. Miller.

# Lime Kiln Thermal Efficiency

By VICTOR J. AZBE, Consulting Combustion Engineer, St. Louis, Mo.

It is an honor to address this organization and the writer expresses the sincere hope that mutual beneficial results will be obtained. Many years have been spent by the one who presents this paper in the study of combustion as applying to industrial concerns and it was only about a year and a half ago that attention and study was given to combustion as applies to lime burning, with the result that there is no question of doubt but what attention to this subject by the member companies of this organization will result, not only in saving in the fuel cost but increasing efficiency of their plants as well as improving their products.

There are few industries where so much fuel can be saved as the lime industry. On the other hand, also, there are, few industries where it is so difficult to make this saving. The difficulty is mostly due to the fact that convenient methods for measuring kiln performance are not generally known, consequently, in very many cases fuel efficiency check of any accuracy is not obtained until at the end of the year. Even when a kiln test is run and all lime and coal weighed, the test has to be of so long a duration to mean anything, that all kinds of bad or possibly good conditions were bound to have crept in and so the final results could not possibly have portrayed the best possible conditions.

As a result of the above, many lime plants waste tremendous amounts of fuel. The fuel efficiency of many a kiln is only 20 to 25 per cent, when an efficiency of 50 per cent and more is possible with proper attention. A certain large lime plant was operated for an entire year at an average efficiency of only 24 per cent. They saved some \$25,000 a year by changing the firing methods, while if they would approach the 50 per cent kiln efficiency mark the saving as compared with the 24 per cent efficiency operating methods would be around \$40,000 a year in fuel only.

Some lime kiln operators think they know when a kiln is right by appearances; and while it is true that an expert kiln operator can tell a great deal, his senses are not delicate enough to be able to judge combustion and heat absorption efficiency of a kiln

except very roughly. The more the writer has to do with lime kilns, the less inclined he is to guess and the more he depends upon proper instruments as an aid.

When a kiln test is being run, it necessarily must be run for at least one week, during which time so many conditions may creep in that the final results tell only very little as to how the kiln should be operated for best results. To overcome this, the writer developed a method which is very interesting and should prove of value to engineers and chemists in the lime manufacturing plants.

When coal burns under a boiler, the carbon combines with the oxygen of the air to form carbon dioxide. The same happens in a lime kiln, only there carbon dioxide is also being driven from the limestone by the heat from the fuel so there are two streams of carbon dioxide, one from the coal and one from the rock. In boiler practice the carbon dioxide percentage in the waste flue gas is being determined in all modern plants because it indicates the amount of air used for combustion and is quite an important check on waste. Many boiler plants have automatic  $\text{CO}_2$  recorders that take samples every few minutes, analyze it and record the results on a chart.

To know the carbon dioxide percentage that is escaping with the waste gas from the lime kiln is even more important. Due to the definite relation between the two mixed streams of carbon dioxide much more valuable information will be obtained than is the case in boiler practice.

With bituminous coal of the better grade, when burned under a boiler the maximum possible percentage of carbon dioxide to be obtained would be about 19 per cent. This is without the use of excess air; ordinarily, even under the best conditions, there will be at least 4 per cent oxygen in the flue gas which is being brought in by the excess air used in burning the fuel which reduces the  $\text{CO}_2$  percentage to 15 per cent.

Assuming now that we are burning this fuel under a lime kiln and we would get only 15 per cent  $\text{CO}_2$  and 4 per cent oxygen the same as we did when burning under the boiler. If



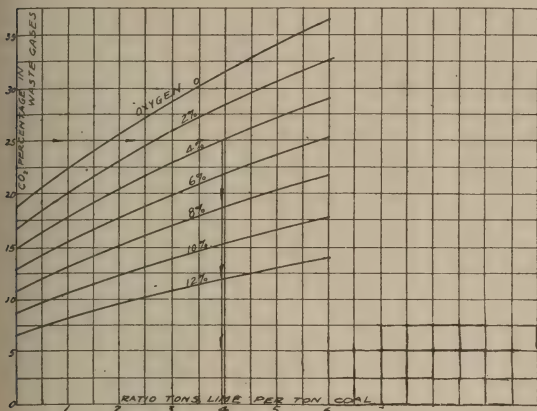


Fig. 1.—Tons of lime made per ton of coal burned.

this would occur it would be quite evident that carbon dioxide is coming only from the coal, none could be coming from the rock and no lime would be made and consequently the ratio of lime to coal would be 0-1. If the  $\text{CO}_2$  percentage would, however, be, say, 20 per cent, and oxygen still about 4 per cent, then we immediately would realize that to obtain such a large amount of  $\text{CO}_2$  gas from coal, when so much excess air represented by oxygen is used, is utterly impossible and so the additional carbon dioxide must be coming from the limestone.

Figure 1 was calculated on this principle. It will be noted that at 20 per cent  $\text{CO}_2$  and 4 per cent oxygen, the ratio of lime to coal is about 2-1. If the chart is further studied, it will be

diluted.

To use the chart it is necessary to have some kind of "Orsat" gas analyzing apparatus. Then a sample should be drawn from top of kiln and main gas stream, taking great care that a true sample is obtained. The sample should be analyzed for carbon dioxide, oxygen and carbon monoxide. After the first sample, several more should be taken, preferably every ten minutes for two hours. Then results should be averaged and by referring to Figure 1, the ratio of lime to coal can be obtained for that particular kiln and for that particular period.

It will be noted that  $\text{CO}_2$  itself, while important, requires to be supplemented by oxygen analysis. It may be also well to emphasize carefulness.

If analysis look unreasonable, try and change the position of the sampling pipe, since it is extremely important that proper true average sample be obtained. At times, also, sudden results will be obtained which will look far from right. Quite often this happens, but all that may have occurred is that the fireman checked his fire, shut off the air to the grates, and the carbon dioxide percentage, instead of dropping down, shot away up, all due to the limestone continued to drive  $\text{CO}_2$  from rock.

After the lime-coal ratio is determined if the

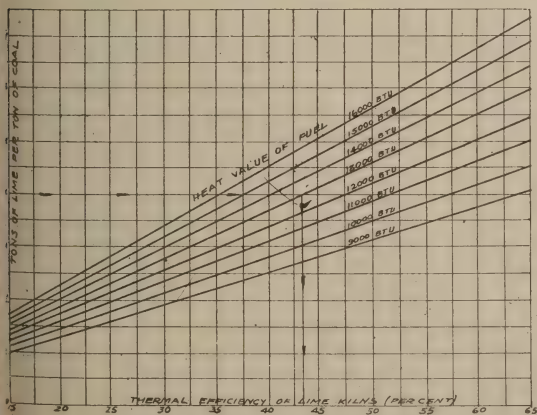


Fig. 2.—Efficiency if ratio of lime to fuel and heat value of fuel is known.

heat value of the fuel burned is also known the thermal efficiency of the kiln may be obtained by referring to Figure II. For example, assuming that the ratio is 4 to 1 and heat value of fuel 13,000 B. T. U. per pound, then by drawing lines through the respective points as shown, the thermal efficiency of 43.25 per cent is obtained. This figure means that 43.25 per cent of all heat in coal was actually used to drive carbon dioxide from limestone while the balance of 56.75 per cent was used or wasted in one or another of many different ways.

If the carbon dioxide, oxygen, carbon monoxide content percentage and temperature of the waste products of combustion escaping from kiln top is known, the most important heat losses can be determined. Under most conditions the greatest loss is that due to escape of gases at a relatively high temperature. In many cases temperature well over 1,000° F. exists, while kilns are operated with normal temperatures well below 500° F. This loss is usually called the loss due to escape of dry products of combustion, and while it varies directly with the temperature, it is also dependent to a very great extent upon the excess air use to burn the fuel, the other inleaking air either through kiln walls, poke holes or draw holes. Figure III enables one to determine this loss. It will be noted that under good conditions, represented by CO<sub>2</sub> 30 per cent, oxygen 2 per cent, and escaping gas temperature of 600°, the loss would be 15.5 per cent. If on the other hand CO<sub>2</sub> would be 19 per cent, oxygen 8 per cent and temperature 900° F, the loss would be 37 per cent.

This chart emphasizes the harm done by the inleakage of too large amounts of excess air as represented by the oxygen percentage. Many kilns are operated with 10 per cent of oxygen which represents about twice the amount of air actually necessary. This unnecessarily large volume of air passing through the kiln does damage in three ways:

- (1) It necessarily escapes hot from the kiln and consequently wastes heat.
- (2) It overloads the kiln gas carrying capacity use-

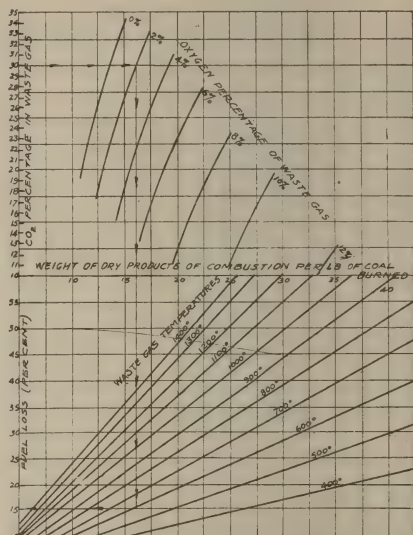


Fig. 3.—Fuel loss due to escape of dry products of combustion.

lessly and consequently reduces kiln capacity.

- (3) It reduces temperature in the kiln due to which the heat transfer between hot flame and the lime is reduced and kiln capacity lowest.

The second condition is illustrated by Figure IV. It will be noted that the greater the oxygen percentage, the lower the kiln capacity. The principle assumed in drawing this chart is that if the air which uselessly passes through the kiln would be employed to burn fuel, more fuel would be burned and more lime made.

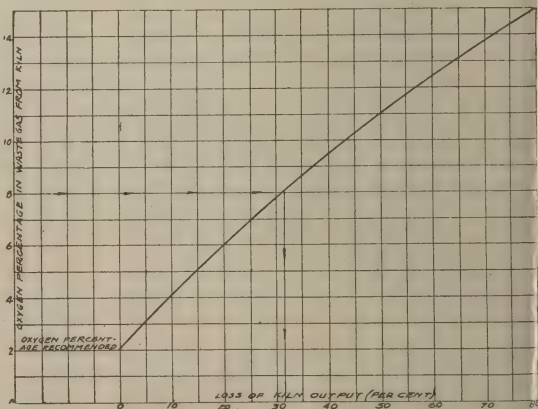


Fig. 4.—Loss of output due to excess air.



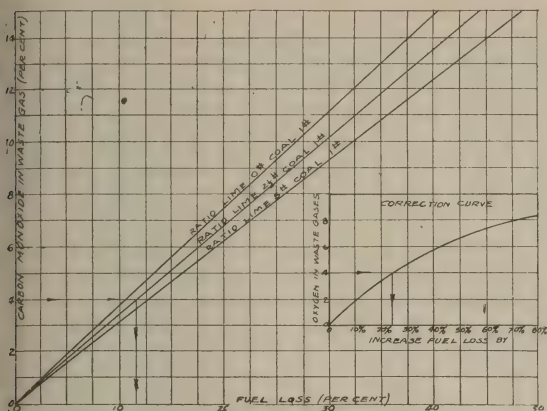


Fig. 5.—Loss due to incomplete combustion (carbon monoxide loss).

As to the third condition, it may be said that it is possible to use so much excess air that the dilution would be so great that temperature would be below the temperature required to decompose limestone and so no lime would be made no matter how much fuel would be burned.

Some excess air however, is necessary, otherwise incomplete combustion, a second most important loss of heat from lime kilns, will result. This loss in some cases is so great that the gas burns to a height of 10 or more feet above the shaft kiln and at night illuminates the surroundings. Of course only gross carelessness will permit such condition, but even in plants where this does not occur the loss due to incomplete combustion at times is from 30 to 40 per cent.

The presence of carbon monoxide, a combustible gas resulting from gasification of carbon, in the waste gases leaving the kiln, indicates a loss due to incomplete combustion.

Figure V illustrates the seriousness of having as high as 12 per cent carbon monoxide in the waste gas; when this occurred the loss of fuel was about 37 per cent., all of which was preventable. Even when carbon monoxide percentage is only 4 per cent, the loss still is 11 per cent. The loss calculated from presence of carbon monoxide percentage is, however, not the entire loss due to incomplete combustion. When carbon monoxide is present, it may well be assumed that hydrogen, methane and other very rich combustible gases are also escaping and wasting heat.

If there is a proper mixture of combustible gases and air, the vertical lime kiln should not waste any heat whatsoever, due to incomplete combustion, because conditions are ideal. The gas burns in a hot zone where there is no possibility of chilling. Due to it having to percolate through the limestone, the mixture of combustible gases and air is bound to be very complete also. The writer many times obtained gas samples from lime kilns when the oxygen content was zero and there was no carbon monoxide present. The fuel was completely burned with only a theoretically re-

quired amount of air.

In practice, to assure complete combustion, it is necessary to use some excess air. About 2 per cent of oxygen in the waste gas should indicate a sufficient amount of air, provided this air passes with the gas through the hot zone. This amount however will be insufficient if firing is irregular. In the case of a plant where the results were tabulated, the trouble was all due to the fact that more coal was gasified in the producer, than could be burned by the air that the kiln could draw by natural draft. A

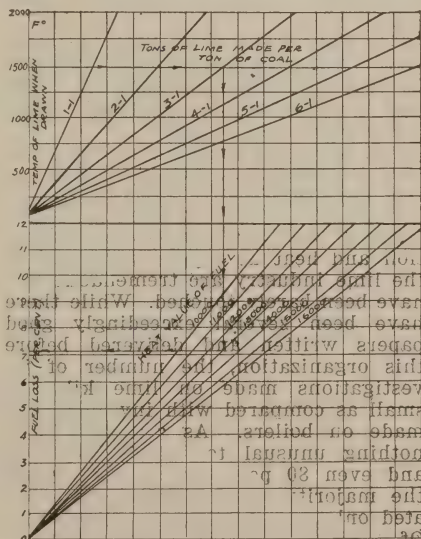


Fig. 6.—Loss due to withdrawal of hot lime.

further reason for the very bad conditions was the very infrequent firing. The producer was charged at 10:25 and again at 11:15, consequently the gas that it supplied to the kiln varied greatly in volume and since the air supply was constant, there was just barely enough air at times for complete combustion, and at other times a great deficiency.

Regular and frequent firing are extremely important in case of lime kilns. When there is heavy smoke, there is great waste due to incomplete combustion. When there is no smoke whatsoever, there is liable to be a great waste also due to the too large volumes of excess air.

There are other heat losses encountered in kiln operation but they cannot be controlled as readily as the loss due to too little air or the one due to too much air, or too high temperature of escaping gases. They are:

(1) Radiation, which can be controlled only by varying the kiln design.

(2) Loss due to moisture in air, which loss is very small.

(3) Loss due to moisture in rock, which loss is also very small.

(4) Loss due to escape of moisture resulting from combustion of hydrogen in fuel. This loss can be reduced slightly if temperature of escaping gases is reduced, and, also, if efficiency is generally improved, so that less coal is burned for a given amount of lime made.

(5) Loss due to withdrawing of hot lime. The magnitude of this loss can be determined from Figure VI. This loss can be reduced somewhat when operator is very careful.

(6) Loss due to carbon in ash. This loss depends upon ash percentage in coal and care used in cleaning fires.

It is the writer's opinion that possibilities for improvement in combustion and heat absorption efficiency in the lime industry are tremendous and have been barely touched. While there have been several exceedingly good papers written and delivered before this organization, the number of investigations made on lime kilns is small as compared with investigations made on boilers. As a result, it is nothing unusual to find a boiler 70 and even 80 per cent efficient, while the majority of lime kilns are operated only around 30 per cent efficient. Of course, to equalize lime kiln and up-to-date boiler performances, would

require a special lime kiln construction; nevertheless, the difference, even in the case of ordinary kilns, should not be so great. The lime kiln is a disadvantage due to greater wall area for the amount of fuel burned consequently the radiation loss will be more than that for a boiler. Also, lime withdrawn is usually at a red heat. But radiation can be controlled by insulation, and to offset the heat lost by the hot lime, the lime kiln has the advantage by the counter current heat flow in upper zones of the kiln and also by the much more thorough mixtures of air and combustible gas in the burning zone. One may say that a good kiln and a good boiler, both properly operated, should give equal results; also, a poor kiln and a poor boiler should give equal results. Why this is not the case is due to two reasons:

(1) In the lime industry little or no attention is paid to proper proportioning of air and fuel.

(2) Heat transfer in many cases is very poor due to ununiform size of rock charge or improperly charged rock.

I think I am safe in stating that nearly half of the fuel burned by lime manufacturers is wasted; which waste should be prevented.

The firm of Spruill & McDill of Mangum, Okla., was dissolved on April 23rd, Mr. Spruill retiring and Mr. E. L. McDill continuing the business.

The Netches Sand Co., Beaumont, Texas, has been incorporated with a capital stock of \$28,000. Incorporators: Michael Storhang, Ed. McCaskey, Jr., and Peter Boade.

William M. Bennett, Kingsport, Tenn., vice-president of the Clinchfield Portland Cement Co., of that city, died May 26, at the age of 56 years. He was stricken with an attack of acute indigestion. He was a native of Bangor, Pa., and resided for many years at Nazareth, Pa.

Numerous residents of El Cerrito, Calif., have petitioned the city trustees to take action to prevent the erection and operation of a quarry in the hills near the Berkley Country Club. The first reading of an ordinance restricting buildings which will meet the request of the petitioners has been passed, it is reported.





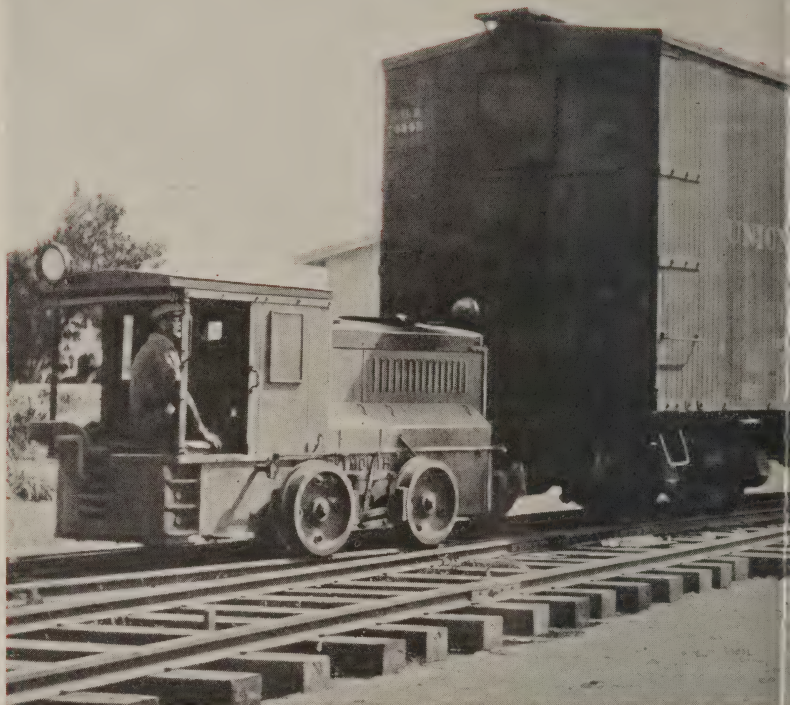
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A complete buyers' reference that will serve you well.

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## Los Angeles Rock & Gravel Co.

The Los Angeles Rock & Gravel Co. are building one of the largest plants in California, having a capacity from 3000 to 5000 tons in ten hours, handling material from a deposit of over 300 acres, by steam shovel, boom drag and dredge.

Many carloads of equipment and lumber were hauled by a Plymouth locomotive from siding to plant, a distance of one mile.

The Los Angeles Rock & Gravel Co. have since bought two more Plymouth locomotives. Three Locomotives will be used for hauling material from the pit to the plant, placing and hauling empty and loaded cars after the plant is in operation.

Read the letter in adjoining panel—then write us for Catalog and other Views.

**THE FATE-ROOT-HEATH CO., PLYMOUTH, MASS.**

**PLYM**  
*Gasoline*





## horse Plymouth Locomotives

### Los Angeles Rock & Gravel Co.

Los Angeles

The Fate-Root-Health Co., Plymouth, Ohio.

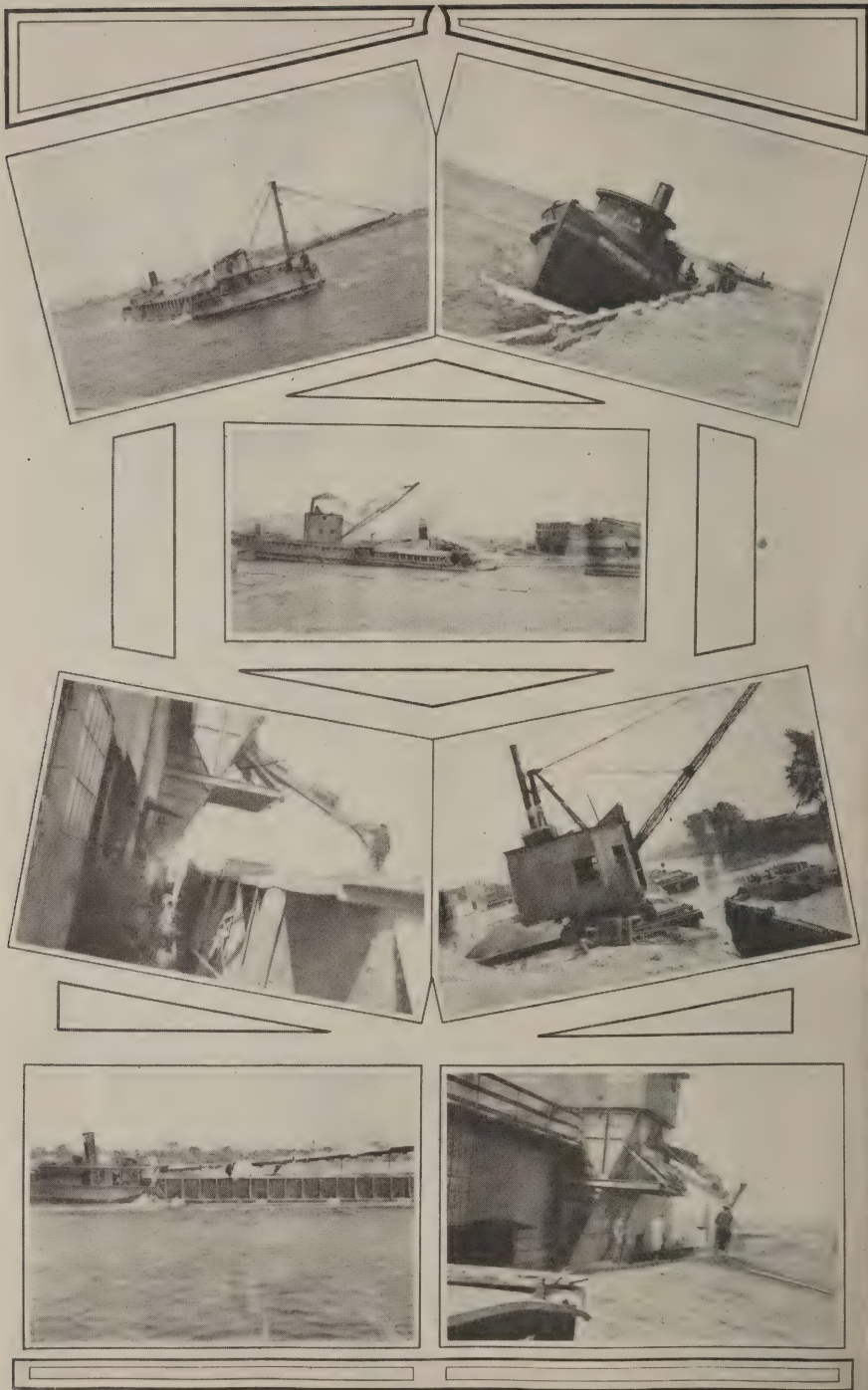
The Seven-Ton Geared Plymouth Locomotive you sold us is giving entire satisfaction. We are using it to haul standard gauge cars on a grade  $\frac{3}{4}$  of 1 per cent and have hauled one hundred and fifty tons without sand easily and would buy more if our needs demand them.

For industrial haulage it can't be beat.

Very truly yours, (Signed) H. W. HAWLEY, Pres.  
LOS ANGELES ROCK & GRAVEL CO.,

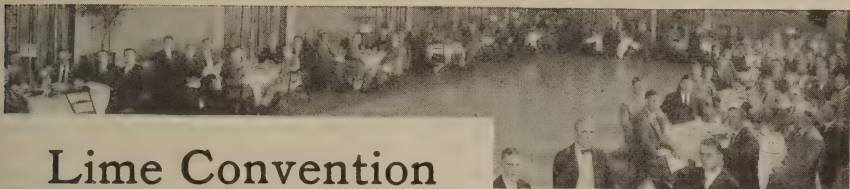
# OUTH

ocomotives



Some views of the dredging operations of the Empire Limestone Co., Buffalo.





## Lime Convention Shows New Developments in Industry

The Annual Convention of the National Lime Association, held this year at the Commodore Hotel in New York City, accomplished a great deal of good for the lime industry; or, at least, it served the purpose of laying before the membership for discussion the results of a year's work that will redound to the advantage of lime producers everywhere. The production by the Association's technical staff of a quick setting time plaster and a lime partition block, and the extension of the uses of lime in highway construction are milestones of progress in the road that lime producers have been traveling as an association for a number of years.

The attendance at the New York meeting was not as great as it has been on some former occasions, but the reasons for this are found in the inability of some lime men to spare the time required for a trip to New York from certain far removed sections of the country. Those members who did attend made up by their enthusiasm and the manner in which they handled the work of the convention for the shortage in attendance; which shortage was, after all not great.

The first day's sessions had to do with the business of the Association and with the consideration by the membership of reports by the officers on the condition of the Association. On the morning of this day, Wednesday, June 13, the Board of Directors met at 11 o'clock and remained in session for one hour. Then followed a luncheon and the resumption of business at 2 o'clock with the entire membership in attendance. This afternoon session was opened by the address of Charles Warner, president, who gave way next to W. R. Phillips, general manager. Mr. Phillips presented his executive report. On the material thus laid before the convention was conducted an informal discussion that

lasted the rest of the afternoon. No formal action on any matters was taken at this meeting, such action being reserved for the executive session on Friday.

At 10 A. M. on Thursday, the second day, Mr. Warner again opened proceedings by a short address. In it he drew attention to the fine condition of the lime business throughout the United States at the present time, as evidenced by Government reports and the statements of producers. The chemical field continues to become more and more important and the demand for lime in construction shows a healthy increase. Association work has played a large part in bringing about this desirable condition, although the results of this combined effort may not always be immediately apparent. The good that resulted comes from work that was done or, at least, begun a long time ago. One of the features of Association work that must be remembered is that its results are not produced and should not be expected immediately. In the case of individual effort this is frequently not the case. Individual effort, while looking to the future, attends mainly to the present. Association work is intended chiefly to guard the future, and the future is, after all, the most important. Mr. Warner concluded his address by announcing that it was his intention, with the expiration of his terms, to participate in Association affairs merely as a member, that the press of other business made it impossible for him to serve longer as president. He thanked the members for the co-operation he received while in office and bespoke for his successor the same loyal assistance that had been given to him.

The report of the general manager was next presented. Mr. Phillips began his talk by referring to the Association's organization plan and its

division into an executive office, a headquarters technical staff and a field service, this last division subdivided into two groups to cover the Eastern and Central territories. The efforts of all were bent toward the achievement of association ends through research, education and promotion. Activities during the past year were greatly enlarged, this made possible by the expenditure of more than twice as much as was spent the year before. The Association has now an increased number of fellowships and is keeping 12 to 15 men full time at leading institutions of learning in various parts of the country. The effort from a research point of view has been to put lime into new fields and to make it serve better the requirements of the fields in which it has found use up to this time. Mr. Phillips then outlined the activities of the executive office, the headquarters' technical staff and the field service. In the last year the technical staff has, among other things, devoted its attention largely to the production of a quick setting lime and a structural lime block, to the development of a ready mixed lime mortar plan, to the recognition of lime in roadbuilding, to the production of handbooks and other literature for operators and users for the purposes of increasing the demand for lime and of aiding in its production and sale, to the publication in technical journals of articles designed to bring technical men more closely in touch with the newer developments. The work of the field service in the Central and Western states has been gotten well under way and good results have been obtained. In the East conditions have been rather more unsettled and, because of the fact that appropriations for the work were not decided upon until later in the season, actual accomplishment has not been as much as in the other sections.

Although Mr. Phillips made no reference to the fact in his talk, it was by this time known to all attending the convention that he had resigned as general manager of the association and would shortly take up the duties of sales manager of the American Lime and Stone Company. Pit and Quarry wishes to take this opportunity to wish him well in his new venture and to add to the expressions of esteem received by Mr. Phillips from the membership its own expression. The editors of this paper have been watching Mr. Phillips' work with admira-

tion and are sure that no better man could have been in the position of general manager during the time he held that office.

Mr. Phillips was succeeded by J. A. Slipher, the Association's soil technologist. Mr. Slipher treated first the more general aspects of the past year's work in promoting the use of agricultural lime. He told his auditors that the Association has cause for confidence as a result of the three-year effort to get more lime on the land. The resistance to liming is breaking in many quarters, largely as a result of Association activity. The present liming practice is due for a change and Mr. Slipher looks for the change to come in the direction of an increased use of burnt lime. This material is steadily getting into state after state where it has not been used up to this time. For 15 to 20 years many of the states have gone through campaigns aimed at the introduction of a liming system calling for 2 to 4 tons per acre of ground limestone of indeterminate fineness. The argument was that the work is done years later. In spite of the way it was advocated, this liming plan has not had wide use. This, said Mr. Slipher, is because the use falls far short of the need. In Ohio where ground limestone is used, and where it has the advantage of favorable freight rates, it has not been a success, and its proponents admit that it has not been. The present system of using low grade materials does not fit the farm scheme. Its shortcomings are appreciated more keenly by the farmer than its advantages. It is not good from a business standpoint. Its availability is low and the farmer has to wait too long for returns. He often has not enough capital to put on 2 to 4 tons per acre, the expense and difficulty of shipping and applying are too much for him. Application is made at a time when the demand for labor is at its peak. Modern farming calls for the cutting of labor to the limit. The plan, too, is psychologically bad. The application of 50 to 100 tons of material in the busy season with no immediate returns to be expected, strikes the farmer as bad. He is nervous at planting time and strongly disinclined to pay attention to anything else. The requirements in an acceptable system are that little labor be required, that there be little disturbance of the farm plan, that there be a small initial investment of not over \$4.00 per acre,



that this investment be a short term one, that the returns be quick.

From the technical point of view, says Mr. Slipper, it is not necessary to reduce entirely all the acidity of the soil. Liming follows the law of diminishing returns. The new scheme calls for the application of but 400 to 700 pounds of burnt lime per acre or in every 3 or 4 years. The advantage of the burnt product are that the quantity to be applied is small, the action is quick, and the results are good, as the success of burnt lime in old liming sections testifies. The late successes of burnt lime in Pennsylvania and other states argue for a new day in liming practices.

The report of the construction department was given by R. P. Brown, the Association's construction engineer. Mr. Brown's paper began with an account of the nature and scope of his duties and was devoted thereafter to a report on the way in which the work was done and the results that were brought about. There is in this department a great deal of routine and special correspondence, ranging from practically form letter work to letters that require days of study. Many problems are referred to the Washington office and it is Mr. Brown's duty to solve that large part of these problems which refers to construction. Cooperation with the field force is also a large and important feature of Mr. Brown's work. The field work along construction lines is progressing well and the reports of field men are very gratifying.

Mr. Brown has during the past year represented the National Lime Association on various technical committees and before technical societies. One of the purposes, and happily one of the effects, of this representation has been to stimulate experimental work in private and public laboratories, all of which has reacted to the advantage of lime.

During the year was published the sales manual which deals among other things with construction topics. In it outlined advantages and uses of lime. The book is loose leaf in form. It is issued only to members. An issue of 15,000 copies of Bulletin 308, containing letters from engineers, has been put out. Bulletin 301 has been revised, Bulletin 300A is now ready for printing and Bulletin 305A is in course of preparation. An extensive mailing list of architects, engineers

and builders has been prepared and should prove very helpful. It contains 11,200 names, all carefully selected.

Many city building codes are being revised as a result of good work by members of the field force, working with the headquarters office. These men are always on hand to prove the care of lime and answer objections brought against the material. The work of Mr. Shertzer of New York in having a favorable resolution passed by the Building officials conference was particularly mentioned. Illustrated paper before interested groups have proved of great benefit. Special work in Pittsburgh made it possible to give lime an opportunity to show up well in paving work.

At the conclusion of Mr. Brown's report the president drew the attention of the membership to the forward stride that lime in structural work has taken, as shown by the production figures furnished by the Department of the Interior. In 1921 the construction tonnage was 1,200,000, in 1922 it was 1,891,000. This represents an increase of 48 per cent and Mr. Warner expects the 1923 figures to top 2,000,000 tons.

Next came the report of the highways department, delivered by W. A. Freret, special representative of the Association. Mr. Freret referred first to the increased use of the hydrated product in road work. This has come more and more into demand all along the Atlantic seaboard states and in the Central West as far as Kansas. The big job is, of course, to have the material specified, and this was found to be difficult on many occasions because engineers had already committed themselves on the subject and could not see their way clear to back down. The argument in most cases was that it would increase the cost of construction. It is true that lime does not belong in all road jobs, and in some places the use of lime merely means the throwing away of money. But the general trend of engineering opinion is toward a greater use of the material. The hardest part of the job was a determination of the best manner of approach. In most cases the state highway engineer was seen first, then the matter was taken up with Washington. County engineers were also visited. Here Mr. Freret remarked that a great deal of good could be done by producers if they would take the matter up with county engineers in their own sections. A diffi-

cult feature of the work is that there is no such thing as uniformity of specifications. Road building requirements in the various states vary widely. A good field for lime in roads is offered by the big cities in the paving of streets and alleys. The bridge engineers are "lined up" better, and nearly all of them use lime. The value of lime in water tightening and in improving the appearance of the structure has helped greatly. There is a good field for lime in white-washes. Some states are now white-washing all the poles and fences along the roads. Another important place for the use of lime in road building is in sub-grade treatment. Dirt and clay roads are greatly improved by its use. The whole field of road building, says Mr. Freret, should be gone after strongly. It will more than justify the effort.

The report of the chemical director was given in person by M. E. Holmes. Dr. Holmes referred first to the Association's participation in exhibitions of various kinds, particularly the Chemical Exposition held yearly in New York City. He then spoke of work on the specifications of the American Society for Testing Materials and the important work that has been done in this direction. The chemical department has also paid particular attention to the matter of furnishing articles for the technical organs of the country, also to the work of benefiting association effort through reprints of these articles. Care has been taken to collect all literature of this and foreign countries that has any bearing upon the subject of lime. In September, 1922, Dr. Holmes discharged the duties of Mr. Phillips, during the latter's absence on association business. A certain amount of field work was also attended to in person. A visit to Monroe, Michigan, resulted in the establishment of a lime process water softening plant in that city. Personal contact also brought about the use of lime in the Fort Worth plant. Co-operative work with Mr. Elton Darling, representative of textile interests, caused 2 mills to try out lime processes, and it is Dr. Holmes' opinion that much good can be done here. The Bureau of Mines, through Dr. Oliver Bowles, has done some helpful work, and it is hoped that this is only the beginning of such co-operation. Much information has been prepared for publication and work is go-

ing ahead on a new sales manual for chemical salesmen. In addition to all this, the department has handled a great amount of correspondence along lines designed to increase the demand for lime in chemical fields. Another big work was the card indexing of all published information on lime from all parts of the world. There were many miscellaneous activities too, of kinds indicated by the assistance given a Western manufacturer in adjusting a freight rate that hinged upon certain similar uses between lime and calcium phosphate. Dr. Holmes was also pleased to report that the use of lime in glass making and water softening is on the grow.

The Chemical department is deriving a great deal of good from its fellowships in certain leading educational institutions. Much valuable work has been done outside the association's laboratory. Tests on lime in plaster and asphalt paving and tests on quick setting limes have been productive of good results. The lime tonnage in the chemical field is continually growing. Some may think this due solely to the war. This view is disproved by the reports of the Geological Survey, which show that the use of lime in post-war years is holding strong and thus indicating that its applications are now resting on a sound basis of experience and results.

"Late Developments in Quarrying" by Oliver Bowles, mineral technologist, United States Bureau of Mines, was an interesting and profitable paper. Dr. Bowles told of the work of the Bureau and the way it is endeavoring to co-operate with lime manufacturers in the solution of their problems. Questionnaires were sent to all the producers some time ago and a great deal of information has been received. The returns have been gone over, but have not yet been thoroughly analyzed. When they have been, it is certain that they will be of distinct benefit to the industry. Dr. Bowles then touched upon specific features of quarrying for kiln stone. He referred to the way in which operators differ in the use of the churn drill in high blasting. Blasting by this method usually throws down large stone and results in a mixing of the various stones in a series. The power shovel does not work out well in very many places because of the inability of the machine to sort the stone and send forward only correctly sized stone of the right



quality to the kilns. And yet there are economies that come with shovel loading that the lime plant operator would like to enjoy. Dr. Bowles suggests the use of a picking belt, a piece of equipment that has, at the present time, useful applications in other industries. With the use of this belt the operator could enjoy the advantages of shovel loading and take all the heavy labor out of the loading process. Pickers in other industries develop great skill. Their whole task on the belt is to pick out bad rock and this is, so far as the labor is concerned, an easy matter. Hand loaders are not always the careful choosers they are supposed to be. They are paid usually on a contract basis, so many dollars for so much stone, and their only interest is to get stone into the cars. Dr. Bowles thinks this method worth a trial.

Underground operation is coming more into favor with lime men, says Dr. Bowles. They see that it results in better stone and less spalls. Another matter that might be considered is the value of hand sledging. Hand sledging practice results in the production of stone that runs 78 per cent kiln size, while the crusher gives only 55 per cent of kiln size stone. Dr. Bowles advised the lime manufacturers to think of the future and ask themselves how the industry will take care of the greater proportion of fines resulting from the use of crushers. He would like to see some of the above methods tried out. The really important work must be done at the plants, not in the laboratories.

"Efficiency of Lime Burning," by Victor J. Azbe, combustion engineer, St. Louis, might better have been presented under the title of "Inefficiency of Lime Burning," for the first statement that Mr. Azbe made was that lime producers are wasting fuel in prodigious quantities. Mr. Azbe's paper is presented in full on another page of this issue.

By this time the convention proceedings had run a little ahead of schedule and it was found possible to include among the speakers in the morning sections two others who were to have led off the program in the afternoon. These two were W. A. Freret and M. E. Holmes. Their talks covered the subject of "Lime in Highways."

Mr. Freret told of the big strides that the asphalt top road is making. A road of this type calls for lime in

the sub-grade, filler and top. The effects following upon the use of lime are striking and the market thus opened up is an important one, for the tonnage required is large. To express the condition in Mr. Freret's own words, "the big asphalt producers are going daffy over lime." These big producers are American firms. The amount of asphaltic material imported is very small, although the idea commonly is that most of it comes from outside the country. It is produced for the most part by the big oil companies. This is a very important field and should be well cultivated. Mr. Freret says that if things go on the way they have started, "they'll soon be making roads that are nearly all lime."

Dr. Holmes stated the problem by telling how all effort was bent on introducing hydrate instead of limestone dust. The substitution of hydrated lime for stone dust greatly increases tensile strength of the material and renders it less liable to damage through surface moving, cracking and other destructive actions. By slides Dr. Holmes showed comparisons between various materials for cementing value, tensile strength and penetration. Hydrated lime showed up to big advantage. It bears promise of correcting all the defects of road materials used up to this time, and its effects are permanent and lasting. It makes the softer bitumens more desirable materials and adds to their inherent advantages the quality of standing cold weather without cracking. This was one of the big arguments against their use, and lime seems to have solved the problem. Not so much attention has been paid to the cost factor and a commercial trial would be necessary to determine just where lime stood from this viewpoint. Dr. Holmes then gave the recommended proportions in the cases of a number of materials. His talk furnished food for considerable thought and fitted in very well with Mr. Freret's remarks to show producers what a big field is ahead of them here.

The next business before the convention was that of attending the luncheon. After partaking of a good meal, the manufacturers and their guests were privileged to listen to Mr. Leighton, of the Public Relations Department of the Eastern Railway Association. Mr. Leighton told of the

need for a more constructive attitude toward the railways on the part of the general public and of those whose dealings with the roads are more direct. The growth of the roads and the demands made upon them have been very great. There have been in the past many abuses by and against the roads. In 1907, when the act creating the Interstate Commerce Commission was passed, much power, including that of making rates, was taken away from the carriers. Still more was taken away in 1911 with the establishment of rate making bodies in a number of states. From 1900 to 1912 the roads greatly increased their mileages and the number of their cars and locomotives. Mr. Leighton outlined the causes that lead up to car shortages and stated that if the roads are to keep up with the increasing demands and make shortages a thing of the past, they must earn more. They have not been earning enough since 1920. In 1920 they made no profit and since then have been earning about 3 or 4 per cent until April of this year when, for a short time, they earned at the rate of  $6\frac{1}{2}$  per cent. By the end of this year the companies will have spent \$1,000,000,000 on improvements. There is a great hue and cry at the present time for government ownership, but this will not be popular right now. A number of politicians, unable to achieve their ends in any other way are bent on crippling the roads as much as possible, so that the government can take them over. In concluding Mr. Leighton asked the association to urge a constructive attitude toward the railroad problem to the end that the transportation facilities of the country may be able to serve better.

The afternoon session was devoted to considerations of the lime partition block and of quick setting lime plasters. The membership had been well prepared for these discussions, for samples of blocks and plasters had been on display in the ante room from the beginning of the convention and most of the members had been given an amount of information by one or another of the technical staff. The exhibits were very complete and showed a large number of variations of the block and applications of the plaster. Many physical tests of impressive character were made in the room. It was shown, for

example, how well the blocks stood fire and water.

Mr. Freret gave the first talk on the lime partition block. He recounted first the way in which the plan had been proposed by Mr. Stockett, of the technical staff, and how it had been gradually developed and a method of manufacture fixed upon. Much of the early work was done in the laboratories of the Bureau of Standards and the first blocks were produced by casting. It was soon seen that this will not be a satisfactory method and Mr. Freret, who was assigned to the task, set about developing a plan for producing an extruded block after the manner in which gypsum and clay blocks are made. Assistance in the task was secured from the International Clay Machinery Company of Dayton, Ohio, in whose shops the blocks exhibited in the ante room were produced. The machines on which this work was done had necessarily a number of makeshift features and imposed on the investigators a number of limitations which special design will remove. The tests were sufficient to show that there is every prospect of making blocks that will compare with gypsum, cement and clay and have for certain work advantages possessed by none of these others. The manufacture of lime blocks will be for the producer a new production stabilizer. The blocks may be made in a way that will fit in conveniently with the production scheme and may, when finished, be stored in the open.

With his talk Mr. Freret showed a motion picture of the work in the shops of the International Clay Machine Company. The picture carried the story from the time the lime, shavings and other materials were mixed and up to the time that a finished block together, through the extrusion process was turned out. By no other means could the story have been told as well and all the producers carried away with them a clear idea of this new development.

Next came W. E. Emley, Chief of the Lime Section of the United States Bureau of Standards, who gave the history of the Bureau's participation in the work. He told of how blocks of 3 types and of 38 different compositions were delivered for test and gave an account of these tests and their results. He outlined first the composition of the various products and described the preliminary treatment given them.



They were first dried and no attempt was made to control the heat used for this purpose. Then weights and transverse strength were determined. While the talk was going on a motion picture of Mr. Stockett making the tests was shown. Then the measure of absorption was made and the blocks were subjected to sawing and nailing tests. An idea of the permeability of the surfaces was gained and it was shown how, because of their low permeability, it would be advisable to score some of the blocks. The effect of various substances in the mixture was set forth. Asbestos, for example, makes the block stronger and tougher, but also heavier. The lime blocks are heavier than gypsum and lighter than clay tile.

Next began the discussions on quick setting lime plaster. Dr. Holmes began it with an outline of the association's work, telling how the object was not to improve the product, but merely to devise a means of making it set more quickly, without influencing its other desirable properties. It was not intended to make a stronger plaster, for lime has normally all the strength that is required, more than is had by some other substances used for this purpose. It was first attempted to produce a mixture which could be added to lime, but the technical staff did not find anything along these lines that would prove satisfactory. A mixture that would accomplish a quick set was found, but this could not be shipped easily without treatment with oil, which would have the effect of influencing the time of set for the worse. The effect of the addition of carbon dioxide was next studied and valuable results were obtained at the Massachusetts Institute of Technology where Professor R. T. Haslam, director of the Laboratory of Applied Research, conducted the investigations. The effect of burning conditions and of the addition of a number of substances also were studied. Dr. Holmes told of how hundreds of mixes were made and applied to the sections by a practical plasterer at the Washington laboratory of the association. The results obtained by this method were checked by Gilmore needle tests and it was found that, in all except one case, the results were practically the same. The association looked into the work done by other investigators and examined the merits of patented processes, but found here nothing that it considered desir-

able. The association is taking out patents on all its own developments.

Professor Haslam gave a scholarly account of the work done at the Massachusetts Institute of Technology, illustrating his statement by graphs projected on the screen. He found that, at the beginning of the investigation, there was no available information of any quantity, and that some of the information that was available had to be rejected as unsatisfactory.

Extensive and intensive investigational work showed clearly that there is only one form of lime hydrate, the monohydrate. There is no dihydrate, as had been before suspected. The effect of carbon dioxide additions under various conditions was told by Professor Haslam and clearly indicated by graphs. His paper was highly technical and can be truly appreciated only after more careful study.

F. C. Mathers, Professor of Inorganic Chemistry at the University of Indiana told of development work at his institution. He gave the reasons for set in gypsum, told how final set in lime or gypsum is due to the taking up of carbon dioxide, although neither of these substances is, when finally set, ever changed completely to the carbonate. The addition of sulphates will accelerate the set. Any sulphate will work, but it is desirable, of course, to use the cheaper ones, much as the sulphate of iron, magnesium, manganese, cobalt and nickel. With the addition of too much carbon dioxide there is no action. On the screen were shown tables giving the set with various substances, the results ranging widely apart. With some of the compounds it was desirable to use a retarder. The retarders used with gypsum were valueless. Pure sugars were found to be the best retarders. This was another scholarly and well received paper.

James R. Withrow, Professor of Industrial Chemistry at Ohio State University told the manufacturers that little results in the production of a quick-setting lime can be expected from a controlling of the burning temperatures in the kiln. Kiln temperatures must be regulated for high and low calcium, for dense and porous stones, but beyond this little can be said on the subject; that is, from the point of view of the production of a quick setting material. The complete way in which Professor Withrow pursued his studies would seem to dispose entirely

of the idea that a careful handling of the kiln temperatures will give a lime that can compare in setting time with gypsum.

After the executive session that followed Professor Withrow's talk it was learned that the following officers were elected for the ensuing year: Geo. Wood, Rockland and Rockport Lime Company, president; Fred Wittmer, Ohio Hydrate and Supply Company, vice-president; Burton A. Ford, National Lime Association, secretary; Milton McDermott, Knoxville Sand and Lime Company, treasurer.

In the evening the manufacturers were the guests of the Valve Bag Company of America. This company, as in other years, provided a banquet and entertainment of excellent quality. The East Ballroom of the Commodore Hotel held a jovial gathering that evening. The banquet was of the best, and the entertainers of the most entertaining. The complete show of the Strand Roof Review was brought in and for hours entertained the banqueters with the full show given every evening on the Strand roof.

A feature of the gathering was the presentation to Charles Warner, retiring president, of a beautiful silver service and the spoken and written thanks and well wishes of his associates. Other features were the speeches of the new president, George Wood, of "Jake" Urschel, and of Mr. Hartman of the Valve Bag Company of America. All three of these gentlemen, developing a sudden modesty, had almost to be forced to their feet to say a few words and receive the well wishes of the Association.

The proceedings on Friday were opened by a talk by Dr. G. J. Fink, research chemist of the National Lime Association. Dr. Fink summarized the work of the association in developing a quick setting lime plaster. He showed how, in place of the unsatisfactory data available heretofore, there is now a great amount of valuable information on the subject, information on which is built the splendid achievement of the association in developing this new material. He told of all the long and tedious tasks that had to be performed before anything definite could be accomplished, the listing of hundreds of materials and the receiving of information in there that would make possible the later program. Innumerable combinations had to be made and put through systematic tests.

From these tests were found materials which would quicken the set, and materials which would affect the other properties of the lime. Experiments were conducted with accelerators and retarders and the value of various substances for these purposes determined. On Dr. Fink's work rests a good share of the successful results that have been obtained.

The rest of the morning was devoted to executive sessions. After these, shortly before noon the 1923 convention of the National Lime Association was an event of the past. That is, the event itself was of the past. In every other way it belongs to the future.

A Whitcomb locomotive in the plant of the Wm. E. Dee Company at Cayuga, Ind., is operating on an 11 per cent grade, pulling two cars, each with a capacity of 2 cubic yards. This grade is much beyond that for which this locomotive is guaranteed, but it is nevertheless giving excellent satisfaction.

The Newaygo Portland Cement Co., Newaygo, Mich., is perfecting plans for the erection of a new cement mill at Manitowoc, Wis., to be operated by a subsidiary organization, known as the Manitowoc Portland Cement Co.; the mill, it is said, will be the only such plant of its kind in the state. It will consist of a number of buildings, with power plant, machine shop and other mechanical departments, and is estimated to cost about \$1,500,000. The mill will have a rated capacity of about 3,000 barrels per day. To carry out the project, the parent organization has disposed of a bond issue in the amount noted, and will use the entire fund for this purpose. The Newaygo company has recently enlarged its Newaygo mill to develop an output of 3,000 barrels daily, and is operating at full capacity, with large working force. The company is also active at its stone quarries at Charlevoix and Ellsworth, Mich. Clay H. Hollister, president of the Old National Bank, Grand Rapids, Mich., is head of the company. Others active in the organization are Frank W. Renwick, president of the Chicago Gravel Co., Chicago, Ill.; J. W. Alder, president of the American Sand & Gravel Co., Chicago; George Vits, president of the Aluminum Goods Mfg. Co., Manitowoc; and Charles C. West and L. E. Geer of the Manitowoc Shipbuilding Corporation, Manitowoc.



## Is Now Incorporated

### Sand and Gravel Association Also Making Progress with Accounting System

(By Our Washington Correspondent)

The National Sand and Gravel Association is now an incorporated body. It was incorporated in Washington on Monday, June 18, and by reason of the incorporation places itself on a par with the largest organizations in the country. It can now sue and be sued, although as Secretary Barrows explains the Association has no desire to be sued nor will it incur a civil suit.

Secretary Barrows states that the accounting system which the Association is devising for use by its membership is progressing rapidly to completion. He states that the committee working out the system will soon have it ready to submit to the membership and it is his belief that it will offer a solution to many problems of book-keeping and accounting which sand and gravel producers now face. It will be offered to the membership at no cost, the expense of devising the system being borne by the National Association.

When President Harding addressed thousands of Shriners during the recent convention here he impressed upon his fellow members of the order the far-reaching importance of the further development of a national system of highways. Every year of development of rapid and universal transportation, he declared, makes it more unthinkable that suggestion of disunion shall ever be tolerated again.

"The amazing mobilization of the forces which only yesterday were fighting for civilization, was possible in no small part because the roads built by the Caesars were still available for such tremendous movements," the President asserted. "If the time comes when our country has need of like mobilization in the national defense, a perfected system of highways will be one of our most powerful bulwarks."

That the business of the Nation is turning more and more to highway transportation is indicated by statistics on motor-vehicle registration, compiled by the Bureau of Public Roads. It has been frequently said that the

traffic is always ready and waiting when good roads are built, and that the commercial vehicle as a class is more handicapped by lack of good roads than the pleasure vehicle. The increase in the registration of commercial vehicles, coupled with the present activity in highway construction, seems to bear out this statement in the opinion of department officials.

A good road is such a paying investment that it is the poorest kind of business judgment to do without it, according to the bureau. The bureau produces figures based upon a survey of traffic in Connecticut to prove its contention. The bureau believes that there is no doubt that an analysis and comparison of the highway costs and the vehicle operating cost in any particular case will demonstrate the economy of improvement wherever the traffic is sufficient to call for any improvement at all.

Road building during the present year is expected to equal or exceed that of last year, according to the bureau. Figures are not yet complete, but the bureau believes the general outlook is considerably better than one year ago, when the railroad and coal strike loomed as disturbing factors. It is pointed out by the bureau that with road users paying a more equitable share of the cost, highway finance is placed upon a firmer foundation.

Mr. and Mrs. Frank Renwick of Chicago, Mr. Renwick being connected with the Chicago Gravel Company, are motoring through the East and on their trip the latter part of June stopped at the headquarters of the National Sand and Gravel Association in this city.

The Industrial Sand and Gravel Corp., Lawton, Okla., has been incorporated with a capital of \$60,000. J. W. Eastman, Sim Sheppard and Andrew Crosby, Lawton.

F. A. Braman and Kenneth Dickerson of Riverside, California, have opened up a gravel screening plant, which they expect will have a daily capacity of about 100 yards. They expect to increase this output later.

The Sun Portland Cement Company of Boise, Idaho, are enlarging their plant, spending more than a million dollars in equipment, etc. When the work is finished the marketable output will be 1200 barrels per day.

## Drag Scraper Works Under Unusual Excavating Conditions

The plant of the Albany Gravel Company at Albany, N. Y., presents a number of unusual conditions which make it to the visitor an operation of more than usual interest. Located not a great distance from the business center of the city, it is an object of curiosity to many Albanians who are in some cases thus given their first real view of a modern sand and gravel operation.

Albany is a city of hills, and it is from one of the hills that the company is excavating materials. At the present time a face of about 100 feet in height is exposed, making available a run of material that is about 60 per cent sand and contains also an amount of large stones that require crushing. The sand and gravel produced test out well for strength and other qualities and, when washed and graded, form very desirable concrete materials. The proportion of sand indicated above represents rather an over-abundance, but the surplus will be taken care of very well in a concrete block and brick plant which the company is at present erecting.

The sand and gravel, as found in the bank, is fairly compact and this feature is responsible in part for a rather unusual excavating condition. If it were looser and would flow toward the bottom readily and laid along the face at

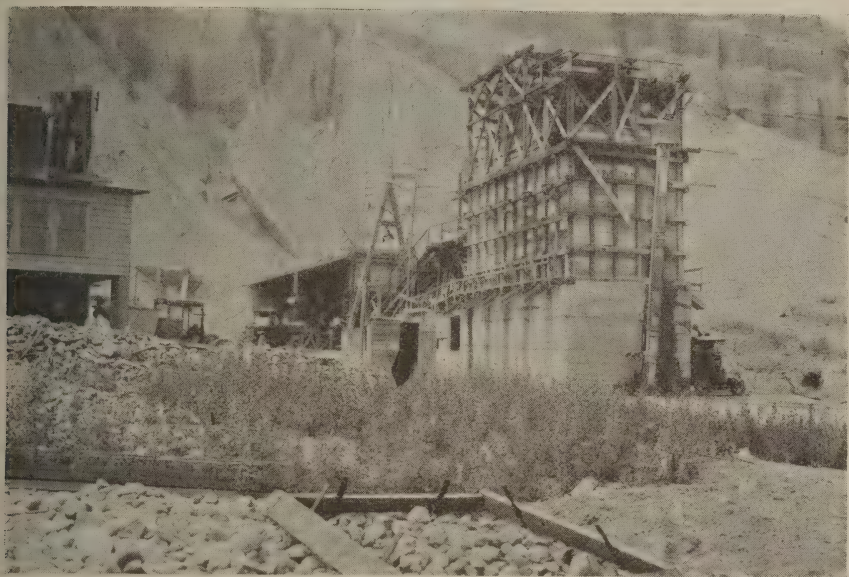


The face of the deposit at point where it is worked.



A shipping belt, installed to load bank run material from receiving hopper.

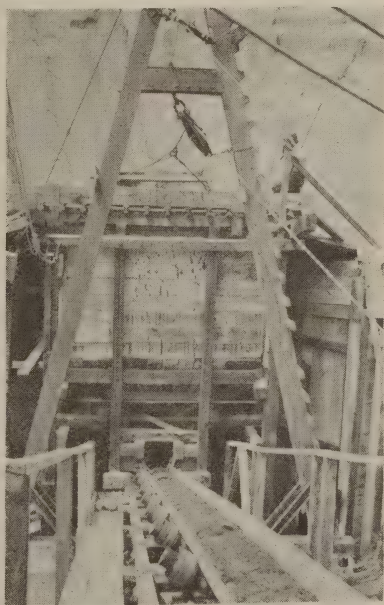




General view of plant and part of deposit of Albany Gravel Co.



Looking at the plant from the receiving hopper.



Flow of materials from receiving hopper to plant.

practically the angle of repose, it would be a much simpler matter to carry out the work of excavation. But it does not flow readily, and parts of the face, particularly at the top, are practically vertical, thus creating an unusual condition for the drag scraper that is doing the work.

At the top of the hill, a little back from the face, are located the anchorages for the cable pulling the scraper. From this point back of the face the scraper cables run to the hoist, located at the point where the material enters the plant, at a level with the bottom of the hill. For loose running material this would work out very well. The scraper would keep running up and down the side of the hill, hauling in on its downward course sand and gravel which, when removed, would make way for materials higher up to cave in and fall down into its place. But the materials higher up do not readily cave in in this case and, as a result there is a dug out space down the face and an almost vertical section at the top. Consequently the



The scraper is powered by a double drum hoist

scraper, when it is being hauled back empty to the work is in the air part of the time. This makes it inconvenient to get it settled into a good digging position and subjects the scraper to additional strain because of the fact that the sides are banged at various points along the face.

A Green power drag scraper made by L. P. Green of Chicago, is employed as the excavating tool. As a precaution to insure against injury to the scraper while it is being hauled up the face in the unusual manner described an iron bar has been added across the front of the device. This holds the sides rigidly in their proper positions and prevents severe banging from doing injury.

The difficulty that is at present being experienced with the digging will be done away with when the company installs in place of the two low anchorages a short distance back from the face two masts located much farther back. This arrangement will make it possible to haul the scraper all the way to the top and cause it to dig right from the beginning. The entire slope will be traversed by the scraper, and this action will keep it smoothed out properly.

When material is brought up to the plant by the scraper it is drawn over a bar prizzly which knocks out the large stones and passes the rest to a large hopper about the foot of an elevator feeding a scalping screen in the plant proper. This screen passes its tailings by chute to a jaw crusher, the product of which is fed in with the regular run of material from the main hopper into which the scraper discharges. After the gravel sizes have been taken out and passed to bins,



Green scraper showing reinforcing bar in front.



the sand is sent into 2 sand washing boxes which thoroughly scrub out the impurities and pass washed and graded products to bins.

The plant was designed by the American Road Machinery Company of New York, who also furnished the greater part of the equipment. The hoist used for the scraper is a double drum machine operated direct from an electric motor.

As mentioned above, the company is working now on the erection of a concrete products plant in which they will be able to utilize their surplus materials. This



Giving an idea of the nature of the deposit.

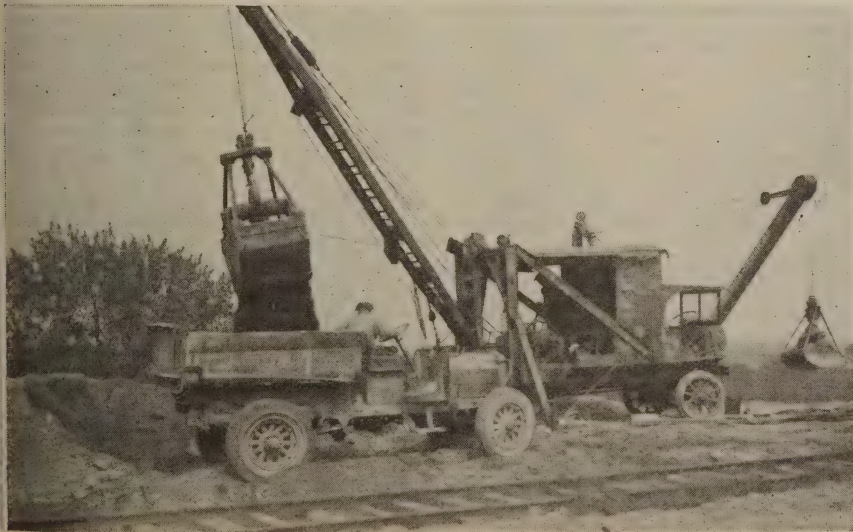
plant will apparently be ready within a month or so.

## Byers Truckcrane at Gravel Plant

At the gravel plant of Jaicks Bros., Batavia, Ill., a Byers Truckcrane is used at any of the jobs where a crane will fit in. The fact that it is mounted on a truck body makes the crane not only a portable one, but also a device that can be sent quickly from one part of the operation to another. A view of the crane at the Jaicks plant is shown

The Lincoln Sand and Gravel Company is enjoying a great deal of success and found last season a particularly good one although in it they lost by fire the old steam dredge which the present electric dredge replaces.

The Silver Springs Sand and Gravel Company, Inc., has been formed at Silver Springs, N. Y., with a capital of \$150,000. Incorporators: G. O. Spaulding, Buffalo, N. Y.





Gravel being sucked up into dewatering tank.

## Fitting Plant to the Job

### How One Company Has Changed Equipment Without Changing Conditions

Has an instance of the way in which a plant can fit itself to changing raw material conditions may be cited the plant of the Ohio Gravel Ballast Company at Miami Grove, Ohio, 25 miles from Cincinnati.

The history of this company's operation at Miami Grove, which is one of five of their pits located in the vicinity of Cincinnati, dates back some twenty years. For the first twelve years little difficulty was experienced in scooping up the free gravel of the moraine deposit at Miami Grove by the use of a steam shovel. At the expiration of this period, water was encountered, and an artificial lake was the creation of twelve years continuous labors. The next six years were spent in dredging in low water, until the banks were exhausted and the deposits were too deep in water to be available by the latter operation.

At this stage of the development a radical departure was necessary to reach the necessary underwater depth, and a suction pump was brought into action. Rocks and boulders weighing up to a half ton prevented entirely the successful conduct of the Miami Grove pit and would have blocked up the intake of the nozzle had it not been for the use of a Swintek traveling suction screen nozzle attached to the intake of the dredge. The traveling screen nozzle, as pictured, con-

sists of a truss frame, on which is mounted an endless traveling chain, armed at regular intervals with rows of projecting jaws, which cut into the banks, stir up the sand and gravel allowing it to readily flow into the suction intake, while it screens out and carries away from the intake of the nozzle and the working head of the machine, boulders and rock that tend to interfere with the proper functioning of the suction pipe. The Swintek machine possibly is up against its greatest test in the Ohio Ballast operation. The boulders encountered in this moraine deposit are many and usually large, and William Donnelly, plant superintendent, states that they could not operate at Miami Grove without the apparatus.

When the picture was taken, the machine was lifted from a depth of some 35 or 40 feet, and no trouble had been experienced in pumping, while the limit under the old dredge system was about 14 feet. It may be thus understood that the company has increased its output over the whole length and breadth of the lake by about 21 feet, which is the difference between the limit of the dredge depth and the bottom reached by the Swintek machine.

The overhead has been reduced under the Swintek suction pump operation. Electricity supplied by the City of Cincinnati has supplanted the steam power and a saving is effected thereby, which in addition is augmented by the fact that the pump seldom runs idle because of a clogged up intake. Past experience has clearly indicated that the stoppage of the run of gravel due to obstructed intakes, consuming some



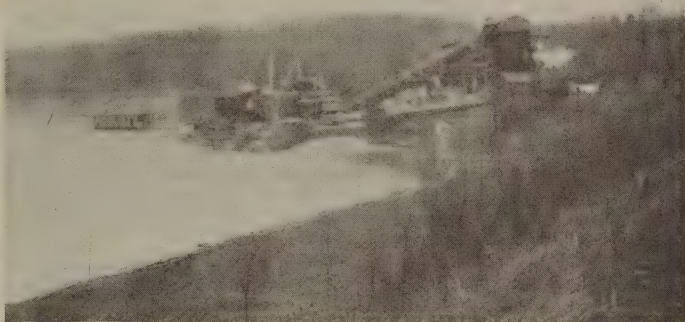
20 minutes each time and which is obviated by the traveling screen, is what causes the loss in money.

The average production of the Miami Grove operation amounts to 20 cars of 50 tons each per day of 24 hours. While this is the output when digging from the bottom of the lake at a depth of some 40 feet, the production is almost trebled when the suction nozzle is penetrating the side banks of the lake.

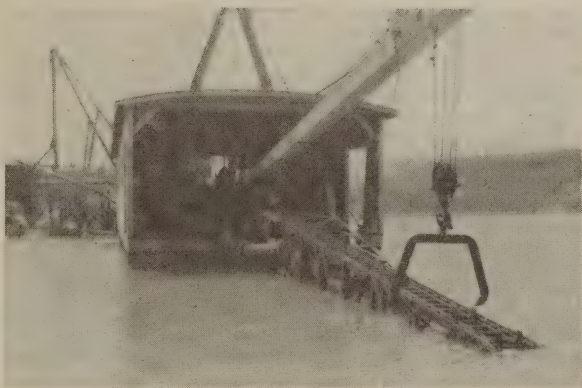
Another saving effected by the suction pump method of working the pit is the small amount of labor employed. Where there were close to two dozen men under the old dredge system, only eight men are needed to conduct the present workings.

The Swintek nozzle is 40 feet long, with a 12-inch screen, and the yield is approximately evenly distributed, 50 per cent gravel and 50 per cent sand.

As shown in the pictures the gravel bar is sucked up through the pipe into the dewatering tank, where the water by gravitation runs back into the lake. The settled deposit of sand and gravel is then dug out by means of a large 75-foot boom stiff leg derrick, with a clam shell, and deposited in a hopper. It is fed out of the hopper by a belt conveyor which takes it



General view of gravel operation.



Front view of dredge and nozzle.



Side view of Swintek nozzle in operation.

## Working Out Better

### Matters in Ohio on the Way to Right Themselves

By Our Cincinnati Correspondent

Paving construction on approximately 87 miles of highway at an estimated cost of over \$3,000,000 is involved in an announcement of June 15th by the Ohio State Highway Department. In addition 98 miles of maintenance and repairs will be up for bids.

The announcements of the Highway Department have met with much approval by the basic material men of Ohio and offer a large impetus for greater efforts of production. On July 1st, the tenure of office of State Director of Highways, Leon C. Herrick, expires, and it is believed that the long standing dispute of Governor Donahey and the Highway Department will be ended, when the Governor appoints a Democrat in the position of head of the Department.

Activity continues in all lines of building in southern Ohio, and it appears to be the opinion that no curtailment such as is now existing in eastern cities is considered. Where in some metropolitan centers building statistics are shown demonstrating thousands of dollars worth of building programs being suddenly held up because of high building costs, there have been no operations withheld in this section worthy of mention. Material prices continue stationary, as follows; washed gravel, \$1.50 f.o.b. cars per ton, sand \$1.20 f.o.b. cars, cement, \$2.99 a barrel; and lime \$16.80 a ton. Production of materials continues unabated, with ample supplies on hand. This is due to a considerable degree through the improved railroad service, according to building supply houses, who enjoy a steady past month of business.

The Ohio Gravel Ballast Company report their five plants at Miami Grove, Miamiville, Milford, Trenton, Ohio and their Indiana pit in full operation. Manager E. Zimmerman of this company states that the railroads are making contracts for rail ballast, sufficient to induce full production. Some difficulty has been encountered in securing an adequate supply of plant labor. The Ohio Gravel Ballast

Company has installed two new pieces of machinery. A Marion Electric Drag Line No. 37 has been installed at their Miamiville operation, and a Bucyrus Steam Drag Line No. 14 has increased the efficiency of the Trenton, Ohio, digging. After a protracted trip in Florida, President Harry Donnelly is back in the Cincinnati office of the company.

The Massillon Washed Gravel Company has been incorporated for \$100,000. Incorporators are, S. A. Swanson, William F. Kutz, Oscar D. Miller, E. L. McLain, and Charles E. Swanson, of Massillon, Ohio.

The Chagrin Valley Sand Company, of Cleveland has been incorporated for \$10,000. The incorporators are F. W. Stanton, J. A. Fenner, Fred F. Truhler, A. M. Loveland, and W. Louis Rose.

## High Point of Activity

### Pittsburgh Demand at Most Encouraging Point

By Our Pittsburgh Correspondent

Activities are being maintained at a high point in the sand and gravel industry at Pittsburgh, Pa. All dredgers are busy on the rivers and large quantities of material are reaching the local market. Distribution is likewise at a good figure, with demand keeping up in a very encouraging way. The summer season bids fair to be of record-breaking proportions and producers are keeping on edge.

Prices are being maintained without important change, and it is expected that current figures will prevail for some time to come. First grade washed gravel is being sold on the water front at \$2.00 a cubic yard, while f.o.b. float the material is quoted at \$1.60 and \$1.65. Delivery at site ranges from \$2.50 upwards, according to length of haul. Local supply dealers are asking close to the last noted figure.

Around \$1.00 and \$1.10 a cubic yard is asked for good river sand, f.o.b. float, with delivery on the dock about 50 cents more. Building supply dealers are quoting the material at \$2.50, delivered on the job.

In the wholesale market, cement is \$2.24 a barrel, without bags; retail stocks are priced at \$3.50 a barrel, with 10 cents bag allowance. Crushed stone



is selling at \$2.85 in carload lots to contractors and dealers.

As an idea of current sand and gravel production in this section, it is interesting to note the figures compiled by the local Federal engineers for the month of April, recently made public. During this month, the haulage on the Allegheny River totaled 82,990 short tons of gravel, and 84,470 short tons of sand; on the Monongahela River, 113,724 short tons of gravel, and 92,792 tons of gravel; on the Ohio River, 78,396 short tons of gravel, and 91,029 short tons of sand.

The Keystone Sand & Supply Co., is operating at full capacity at its plants on the Allegheny, Monongahela and Ohio Rivers, and expects to continue on a maximum basis for an indefinite period. The company has recently secured a contract from the United States engineer's office at Pittsburgh, for furnishing 29,000 tons of gravel and 18,000 tons of sand, to be used in connection with the rebuilding of the land chamber at Lock No. 3 on the Monongahela River.

J. K. Davison & Brothers are maintaining active production at their different plants. The company has its electrically-operated sand digger, "Allegheny," working above Lock No. 3 on the Allegheny River, and is towing some heavy loads to the Pittsburgh docks from this section. The steamers "National" and "Elizabeth Smith" are busy in the later connection, as well as tending the dredge. George McC. Davison of this company has arranged to spend the summer in Colorado.

The Central Standard Sand & Gravel Co., Memphis, Tenn., has had a new steel barge constructed at the Neville Island, Pittsburgh, plant of the Dravo Contracting Co. The barge is 36 ft. wide, 175 ft. long, 10 ft. deep, with capacity of 1,000 tons, and will be placed in active service at an early date.

The Iron City Sand Co. is keeping active with its fleet and delivering large quantities of material at the Pittsburgh landing. Repairs have been in progress on the steamers, including boiler improvements, stack and other work. Present idle vessels will be placed in service at the earliest possible date.

Captain Herman Rodgers of the Rodgers Sand Co., Pittsburgh, has returned recently from Cambridge Springs, Pa., where he has been recuperating from a severe illness.

## Electrical Catalogue Revised

The Westinghouse Supply Catalogue, generally regarded as an encyclopedia of things electrical, is now being distributed. This issue for 1923-24 replaces and supersedes all catalogues issued heretofore on electrical supplies by the company.

In appearance the new catalogue does not differ greatly from its predecessor. The former editions have proved so useful and satisfactory that no essential features were altered, the improvements being largely a matter of detail and refinement.

Appreciating the importance of accessibility to the specific information wanted, the utmost care was used to meet this requisite. The catalogue is indexed according to subjects and to sections, and also has a style number and a thumb index. In addition, a new feature—a classified index—has been added to the introductory section under the title "How this catalogue serves."

The catalogue announces the opening of a new plant at Homewood, Pa., which will be devoted exclusively to the manufacture of repairs and renewal parts for Westinghouse apparatus in service but of design no longer strictly standard. A complete list of all Westinghouse sales offices, agent jobbers warehouses, and service repair shops, is also given, together with several illustrations of new combination sales, service and warehouse buildings either recently built or now in course of construction.

In all, 1,300 pages are devoted to descriptive matter technical data, dimension drawings, specifications and prices. The material includes all apparatus developed in the last two years.

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## I.-R. Folder

The Ingersoll-Rand Company, Easton, Pa., is now giving circulation to a new folder featuring a number of Ingersoll-Rand products, such as portable compressors, jack hammer drills, drill steel sharpeners, pumps, and hoists.

This folder is delightfully prepared and those who are not already on the mailing list for it can have it by writing to the company.

## Hoosier News and Gossip

### Road Building and Material Production in Indiana

By Our Indianapolis Correspondent

A total of 235 miles of roads will be constructed by the state highway commission this year, according to John D. Williams, director of the highway department. Of this mileage, 170 miles will be hard surface type, thirty-five secondary type, and thirty miles grading and building structures.

According to Mr. Williams the season's program is divided into forty contract projects. At this time eleven concrete mixers are operating in various parts of the state, and fifteen additional mixers are scheduled to start in the near future. The commission, in view of its three year construction program, is determined that 1923 building contracts shall be completed on schedule, he said.

Mr. Williams pointed out that more and more the counties are seeking state inspection, a service they are entitled to under the state highway laws. This means that while a county project is paid for by the county, plans and specifications are first approved by state highway engineers, and the actual work is accomplished under state inspection.

To date state highway inspection is in force on 41 county aid projects comprising 125 miles, the approximate cost of which is \$2,254,131.95.

Refuse from washing gravel which stopped a drain tile and lessened the tillability of corn land in the river bottoms three miles north of Clinton, Ind., capable of producing 80 bushels to the acre, is the alleged basis for a venued suit against the Standard Sand and Gravel company, which has been filed in Superior Court at Terre Haute. John A. Strain is the plaintiff. Damages to the extent of \$1,700 are asked. The case has been stubbornly fought in the Vermillion county court, there being a goodly number of cross complaints, answers, demurrers and all other possible actions taken and ruled on by the adjoining county courts.

Van Buren township, Daviess county, Indiana, one of the few remaining townships of the state that has no improved roads, will build its first gravel roads this summer.

A jury in a Marion, Ind., circuit court, after being out about two minutes, returned a verdict for the full amount in favor of John E. Weigel, for gravel supplied to Grant county, and the costs were assessed against John F. Pinkerman and forty representative farmers who had opposed payment on allegations that the measurements of gravel were short. The suit was a civil proceeding, and followed a report of the state board of accounts regarding what was alleged to be the reckless handling of gravel used by the county. The farmers measured the pit and introduced testimony in the attempt to prove that it showed a smaller amount of gravel had been taken out by Mr. Weigel than that for which he sought payment. The court ruled that evidence of a measurement taken six months after the official measurement was not competent unless it could be shown correctly how much gravel, if any, had been taken out of the pit after the measurement had been made, on which the defendant based his claim. The plaintiffs were unable to make this showing, and the court instructed the jury to return a verdict for the full amount of the claim, which was \$8,393.54.

Testimony was introduced by Mr. Weigel to show that after measurements of the pit were taken, farmers had called at the auditor's office and had paid for gravel which they had taken out of the pit without authority. This Weigel's attorneys contended showed the reason for a difference in the first and second measurements.

The Winchester Gravel Company, with a capital of \$35,000 has incorporated to do business at Winchester, Ind. The directors of the company are Ernest M. Clark, Albert E. Fudge, Everett Clark and Walter H. Fudge.

The William Francisco farm east of Ligonier, Ind., has been sold to the Milford Gravel Co., which will operate a washed gravel plant there. A spur track will be laid connecting the N. T. C. main line and extensive operations will be maintained. The company will employ 100 men continuously and will operate on a big scale. The Interstate Public Service Co. has arranged to run a line from Ligonier to Wawaka, connecting the new gravel plant with electric light and power. Machinery will be moved to the farm.

The cost of building a mile of standard, eighteen-foot cement road is about



\$1,000 a mile greater this year than last year, according to Earl Crawford, a member of the Indiana state highway commission. He said stone and gravel cost about 10 cents a ton more than last year and that cement cost about 15 cents a barrel more. Stone, gravel and cement producers tell the commission increased labor costs principally are responsible for the higher prices.

Three thousand miles of gravel and stone roads in the Indiana state highway system are in the best condition since the commission was organized in 1919, according to John D. Williams, department director. Recent rains laid the dust and in many localities this type roads are like velvet, surpassing for pleasure and comfort, travel over hard surface highways. Most of this mileage came through the winter in excellent shape due to constant maintenance and a system of road drainage installed in 1921. "Our greatest problem at this time in state road work is maintaining adequate detours necessary where state roads are under construction," Mr. Williams said. Hundreds of men with motor equipment have been working on all weak spots in the non-rigid type roads.

The Collister gravel pit, Terre Haute, Ind., one time owned and operated by Mr. William Collister, has been reopened by N. G. Wallace, Frank Semour and Frank Hutchinson.

The Orange County Rock Co., has been incorporated at Orange, Calif., with a capital of \$500,000. The directors are, A. G. Wright and Frank Duff, Anaheim; C. V. Barkman, Fullerton; H. B. Wright, Santa Ana; and K. M. Wright, Newport Beach.

The National Gypsum Products Co., Alamogordo, N. Mex., has been incorporated with a capital of \$750,000. The incorporators are: E. F. Hoegerman, Los Angeles; P. M. Holaday, Tacoma; S. C. Rundle, Los Angeles; J. E. Fetz, Alamogordo.

The American Sand Company, Turner, Kansas, has been incorporated with a capital of \$100,000. Incorporators: H. B. Thompson, R. B. O'Brien and L. W. O'Brien. They are shipping sand at the rate of from 5 to 10 cars per day.

## From Southern Indiana

### Activity Reported Among the Various Producing Companies

By Our Evansville Correspondent

The Interstate Public Service Company has announced it will open a large gravel pit within a short time near Columbus, Ind., from which to take gravel for ballasting the track along the company's lines. Four new ballast cars for the company are being built at Jeffersonville, Ind. Twenty-five new freight cars have been ordered to take care of the business. The gravel pit will be one of the largest in southwestern Indiana.

Sand and gravel plants along the lower Ohio and Wabash rivers are extremely busy this season and the owners say that in their opinion their volume of business is going to be much larger than that of last year. A great deal of road building going on in southern Indiana, southern Illinois and western and northern Kentucky is responsible for the increased demand for sand and gravel. Some of the sand and gravel companies along the Wabash river have increased their fleets and bought new equipment in order to take care of the additional business. The Bedford-Nugent Sand and Gravel Company at Evansville, Ind., recently took over the plant of the Evansville Sand and Gravel Company located on the Ohio River at Rockport, Ind., and the company now owns two plants at Rockport that are being operated on steady time. J. E. Wall is the superintendent of both of the Rockport plants. The combined capacity of the two plants is about 40 tons a day. The sand and gravel plant at Tell City, Ind., is being operated steadily and road building in Perry and adjoining counties is greatly stimulating the business. The sand and gravel companies at Paducah Ky., and Shawneetown, Ill., report a heavy business with the indications that trade will continue good the balance of the season or until cold weather sets in. Sand and gravel companies at Hazleton, Ind., are furnishing the sand and gravel for the construction of the new bridge that is being built across White River at that point and a fleet of towboats is being used for the purpose of carrying the material to Hazleton.

## New Bulletin on Drills

Quarrymen will be interested in seeing Bulletin No. 49, recently issued by the Cleveland Rock Drill Company, Cleveland, Ohio, describing their No. 44 Rotators.

The Bulletin claims that this drill will reduce the drilling cost substantially in a number of ways, as described.

This is of particular interest from the purchaser's point of view, while



the operator likes the drill because it is well-balanced, is easy to hold on either flat or down holes, although it hits a very hard blow and shows an unusually good day's work.

A copy of the Bulletin will be sent by the company on application.

The Graver Corporation, manufacturers of steel tanks and water softening and purifying equipment, East Chicago, Ind., has recently published a booklet descriptive of the Graver hot process water softener, which is claimed to be the best adapted for boiler feed hot water.

The principal purpose of the booklet is to compare the merits of two methods of water softening in use and to submit data from which the discriminating buyer may make his purchases for his own peculiar needs.

This is a disinterested survey, inasmuch as the Graver Corporation makes both types and can supply either one which the customer desires.

## Announcement

The Orton & Steinbrenner Co., 608 S. Dearborn St., Chicago, manufacturers of locomotive cranes, dipper shovels and grab buckets, announce a reorganization of the company and the election of the following officers:

P. A. Orton, Pres. and Gen. Mgr.  
E. B. Ayers, Vice-pres.  
Herbert Mertz, Sec. & Sales Mgr.  
Harry Shaffer, Treas. and Pur. Agt.  
G. L. Niederst, Chief Engineer.  
Alex Orton, Works Mgr.

No change in the management, control or policy has been made, nor is any contemplated. The reorganization is occasioned only by the resignation of Mr. H. G. Steinbrenner as president and the disposal of his interest in the company.

The Orton & Steinbrenner Co. was organized in 1906; its factory and works are located in Huntington, Ind., and main offices in Chicago, with representatives in all the principal cities of the United States and Canada.

Beginning with the manufacture of a standard gauge steam locomotive crane, the company has gradually increased its line until at the present time it manufactures eighteen standard models of cranes and dipper shovels—gasoline, electric and steam operated; ten different types of grab buckets, and five styles of coal crushers.

Since its organization the demand for its products has been so great that the size of the plant has been increased several times and at present work is being pushed rapidly in the construction of a new machine shop which will about double the present capacity.

A trolley folder has just been issued covering the new Yale trolleys. It is the first piece of literature to be issued on this equipment, and contains, in addition to detailed descriptions of the plain and geared types of the new Yale steel plate roller bearing trolleys, a description of the new Yale cast-iron trolley. Incorporated in it are the details of very interesting tests to which the new steel plate trolley was subjected, and a complete list of the material-handling equipment manufactured by the Yale & Towne Mfg. Co., Stamford, Conn.

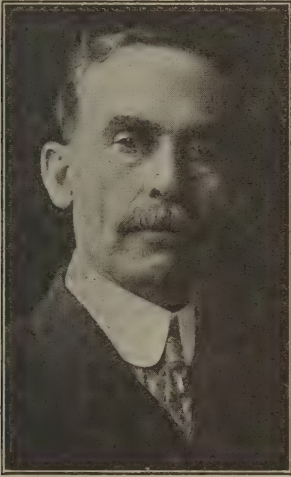
The Little River Limestone Corp., has been formed at Roanoke, Va., with a capital of \$200,000.



## Money In Brick Making

Many producers of aggregates have expanded their business to include the manufacture of concrete products, or have engaged in such manufacture as a separate enterprise.

Some of these have gone into brick making under the Shope patents, and others will no doubt do so after a perusal of the complete and convincing booklet recently issued by the



D. F. Shope

Shope Brick Company, Portland, Ore. This book presents a plan whereby in each city, large or small, there may be established a local industry for the manufacture of Shope brick. It also shows illustrations of many buildings put up with this material, tests which have been made, etc.

In order to provide more adequate facilities for an increasing volume of business in the Pittsburgh district, the Pennsylvania Crusher Company has recently moved its offices from the Peoples Bank Building to more adequate quarters in the Oliver Building, where operations will be continued under the experienced management of Mr. H. M. Hallett, as district manager.

The Link-Belt Company of Chicago and Philadelphia announces that Mr. L. M. Dalton has succeeded E. J. Burrell as manager of the Boston branch office.

## Likes the Hand Book

We thank English Quarry Managers Journal for the kind words it has to say of our Hand Book in its last issue. We are so proud that we desire to reprint it here:

It is the only book of its kind we have yet seen in connection with the quarrying industry, and is published free to the pit and quarry industries of the U. S. A. by the publishers of the PIT AND QUARRY. Its contents are worth the attractive and durable binding it has been given, and from page 1 to page 331 it is a mine of information to the officials of sand, gravel, stone, cement, lime and gypsum pits and quarries. To quote from it is impossible, as it would hardly be fair to take a quotation from one particular section, knowing that all are of equal value; to give a list of a few of the contents in brief must be sufficient for the present:

*Production of Sand and Gravel: Geology of sand and gravel, origin of deposits, etc., operating details;*

*Methods of Producing Crushed Stone: Some geological aspects, quarry practice, etc.;*

*Manufacture of Portland Cement;*

*Talc and Soapstone;*

*Felspar;*

*Lime and Its Methods of Production;*

*The Manufacture of Gypsum;*

*Phosphate Rock and Its Production;*

*Silica and Its Methods of Production;*

*Tests of Road Building Rock;*

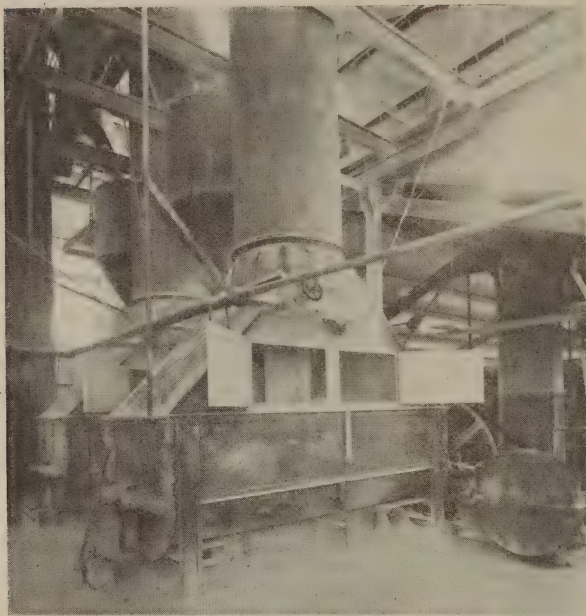
*Injuries and Their Treatment;*

and a great many more, not the least valuable of which is the *Glossary of Terms*, which is a 50-page dictionary of everything connected with the industry.

We congratulate our contemporary in the issue of the most useful book to the quarry operator we have yet had the pleasure of seeing.

The Cleveland office of the Link-Belt Company has been changed from Room 429 to Number 329, and the building in which they have so long found quarters, has again changed hands and names. In the future the address of the Link-Belt Cleveland office will be No. 329 Rockefeller Building.

Uehling Instrument Company, Paterson, N. J. manufacturers of CO<sub>2</sub> recorders and draft and vacuum gauges, have just made two important agency appointments, namely Amsler-Morton Co., Fulton Building, Pittsburgh, Pa. for western Pennsylvania, and Mr. John A. MacDowell, 2039 Railway Exchange Building, St. Louis, Mo., for eastern Missouri and southern Illinois. Mr. H. R. N. Johnson, who formerly represented the Uehling Instrument Company in Minnesota and the Dakotas, has joined the W. P. Nevins Company, 120 South Ninth street, Minneapolis, Minn., which company is now the official Uehling representative in the territory mentioned.



New Batch Hydrator.

## New Hydrator in Operation

A new batch type lime hydrator has been invented and patented by Mr. F. Weber, superintendent of the Woodville, O., plant of the Washington Building Lime Co. Two of these machines have been in operation here for some time and the results have been highly satisfactory.

While in theory the hydrating of lime is merely the simple process of mixing water and caustic lime together in proper proportions, there are practical difficulties to be overcome, so that actual experience alone enables one to know just what is desirable in a machine of this kind. Mr. Weber having had long experience in the operating end of lime production, claims a number of advantages for this hydrator, among which are:

1. Economical in first cost.
2. Low maintenance and operating cost.
3. Minimum floor space—less than 60 sq. ft.
4. Clean and quiet running.
5. Rapid charging and discharging of batches.

This machine is made in one size—to accommodate one ton of raw lime. It

has been found that the great agitation obtained causes practically every particle of raw lime to be thoroughly mixed with water almost instantly; and by means of a simple design of quick acting gate, the entire batch is emptied, leaving no hydrate in the machine.

All parts are accessible for inspection and the only places needing lubrication are the four main bearings.

As will be seen from the illustration, the raw lime is fed to the machine from a hopper which automatically measures the proper batch. Water is introduced by a simple sprinkling pipe and once the correct proportion is determined for any given lime, it is automatically maintained.

Due to the quick charging and discharging of batches in this machine, it can easily take care of from five to six batches per hour.

It has been found that through the thorough agitation and even distribution of the water on the ground lime, the result is a very much more improved product.

Further information can be secured by writing to Arnold & Weigel, contractors and engineers, Woodville, Ohio.

The Pacific Lime & Plaster Co., has been incorporated with a capital of \$100,000 at Sonora, Calif. The principal place of business will be San Francisco. Incorporators: C. W. Curn, F. C. Price, both of San Francisco; C. J. Waterhouse, W. O. Badgley and R. M. Lyman all of Oakland.

The United States Gypsum Co., recently bought a large gypsum deposit in Webster County, Fort Dodge, Iowa. The tract cost \$401,570, or exactly \$1,000 an acre.

The Temple Silica Sand Co., has been incorporated at Harrisburg, Pa. Incorporators: Wellington B. Hunter, Charles N. Hunter and Wellington M. Bertolet.





## Nelson Fordson Truck Loader

A self-feeding bucket loader mounted on a standard Fordson tractor is the latest product of the N. P. Nelson Iron Works, of Brooklyn, N. Y.

Many sand, gravel and crushed stone operators and dealers who wished to buy only one loader to load their wagons and trucks without shoveling from banks and piles which were not adjacent to each other, often expressed a desire for a loader that could move rapidly under its own power. The Nelson people can now gratify their wish with this model machine, as the tractor has a propelling speed up to 12 miles per hour.

Also, prospective purchasers of machinery often hesitate to buy an outfit with any kind of a gasoline driven power plant for fear of poor operating results; and to overcome this, the well-known Ford tractor has been adopted for this type of loader. Simple operation, low costs for power, and general efficiency are now assured.

Two novel features of this machine show a notable development of practical advantage. Instead of crawling in under the elevator, where he cannot possibly see what he is doing or digging, and surrounded by chains and sprockets, the operator now stands on a platform at the side of the machine, with all controls in easy reach and with an unobstructed view of the entire digging and loading operation. This overcomes the great difficulty hitherto experienced of keeping the performance of the loader up to its rated capacity.

The second point is no less important. By connecting the elevator direct to the engine instead of to the usual power take-off, the elevator with its powerful toothed digging spirals runs full speed, while the tractor may be inched backwards into the disappearing pile.

The capacity of the machine is 40 yards per hour of material two inches and under that a man can shovel without the use of a pick. A governor is installed to control the fuel consumption to the actual

requirements. The power take-off remains available should the owner require its use for operating other machinery while the entire loader attachment can be readily removed, and the tractor used for other purposes.

A swivel spout is attached to the loader permitting discharge sideways into truck if necessary. Eight feet six inches clearance under discharge chute. General construction of machine is substantial. Elevator frame is of truss design. Elevator buckets, chains, sprockets, etc. are in keeping with regular design of maker. Those who own tractors can have the loaders mounted on them by the manufacturer.

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The Boston Sand & Gravel Company, 88 Broad Street, Boston, has recently announced its entrance into the retail field, and is now dealing directly with contractors, builders, masons, plasterers, and all users of sand and gravel, maintaining for this purpose a delivery through the Atlas Trucking Company, which is a new corporation controlled by the Boston Sand & Gravel Company. Deliveries are being made from three different wharfs, serving all parts of Boston and vicinity.

---

The Arkansas Valley Portland Cement Company, with offices at Florence, Colorado, has acquired about 5,000 acres of lime and shale just east of the town of Concrete, Colorado, and intends to put in a plant for the manufacture of Portland cement, and will also ship commercial crushed stone.



Shovel on traction wheels in stone plant near Chicago.

## Traction Wheel Mounting for Shovels

The Osgood Company has recently built, and successful tests have been made, of traction wheel mountings for one of the heaviest railroad type steam shovels. The shovel an Osgood 120, 6 cubic yards, is the largest railroad type machine ever built and heretofore they have been mounted only upon standard railroad trucks. On account of the time necessary in laying track for moving the shovel, railroad truck mountings were slow in getting from one point to another. This size shovel is much used in big rock quarries and open mines and usually when blasting operations were in progress it was necessary to lay track and move the shovel back from the face of the excavation and then up again after the explosives and had been set off. These operations were not only costly in time and labor consumed in making the changes, but also in decreased output through time lost, and steps were taken to overcome the difficulty by the Osgood Company.

Giant traction wheels were designed that measure 6 feet in diameter and have a face of 36 inches on the front or drive wheels and 30 inches on the rear wheels. The front wheels are used as drivers and power is delivered through a series of gears from the powerful hoisting engines on the shovel. Steering is accomplished by turning the rear wheels by means of a screw shaft and traveling nut. The nut, to which is attached the axle tongue, moves along the screw shaft,

slewing the rear axle and wheels in the direction desired. The screw shaft is operated by a separate reversible steering engine mounted above deck alongside the boiler, out of the way yet readily accessible.

In recent tests made in a large Pennsylvania stone quarry the shovel was moved a distance in one day that under old track laying methods would have required at least ten days.

A large stone company near Chicago has just installed an Osgood 73,  $3\frac{1}{2}$  cubic yards traction shovel for use in the quarry. The pit is about 80 feet deep and is reached by a very steep incline. To get the new machine into the pit would ordinarily be quite a problem, but when equipped with traction wheels the problem was much simplified. With boom up and dipper and handle in place the shovel was backed down the steep declivity under its own power without difficulty.

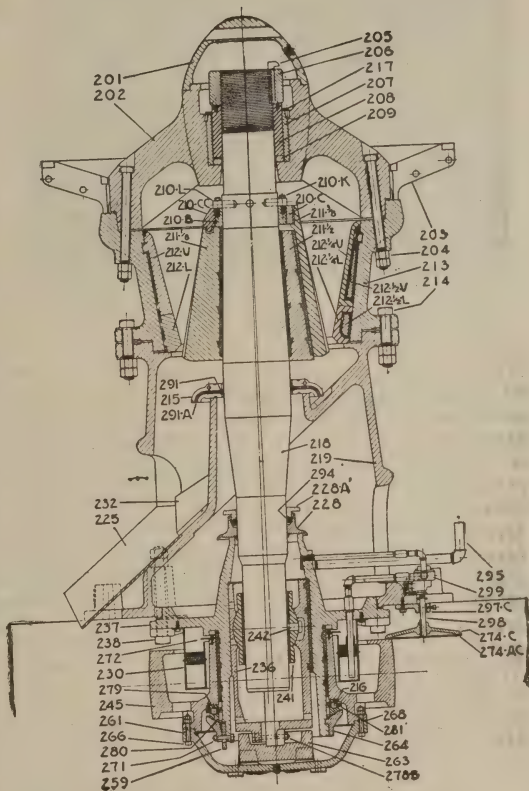
Shortly after this shovel had been placed in operation a cut of loaded dump cars was derailed when some distance from the shovel and on the way to the incline hoist. The Osgood traction shovel was thrown into gear, run down to the cars, a chain hooked over the dipper teeth and around the cars. In a few minutes the train was rerailed and on its way to the hoist while the shovel went back to the rock face ready for work. It would have been necessary to unload the cars to rerail them by hand, and then reload them. While this was being done the shovel and other cars would have been standing idle if the ready mobility of the shovel had not saved the day.



# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- 1—They are noiseless and run like watches.
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- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
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- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 0—Made in our own shop by experts, trained for the job.



- 1—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 2—Our fine crusher does the work of 4 geared crushers.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

**KENNEDY VAN SAUN MFG. & ENGR. CORP.**  
 10 Church St. NEW YORK

CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS



Miss Claudia M. Sargeant, District Manager

The Charles Warner Company of Wilmington, Del., has recently appointed Miss Claudia M. Sargent district manager of their New York district. Miss Sargent was born in New Berlin, N. Y., and after graduating from school in Oneonta, came to New York City and was associated with the Clifford L. Miller Company—plaster manufacturers and distributors. While with this concern she had the opportunity of familiarizing herself with the operation of all departments. Miss Sargent has been connected with the New York office for a number of years and is, as far as is known, the only district manager of her sex in the lime industry.

### Spring Steel Screens

A number of producers are using successfully a type of screen made from small spring steel wire.

This type of screen has two advantages: It lasts much longer, and it screens cleaner because the smaller wire cuts the clay and allows it to pass through rather than clogging the meshes.

One user reports the use of one of these screens nearly four months, during which time it handled about 300 yards per day, with the clay reduced to a minimum. These screens are manufactured by the Twin City Iron

& Wire Company, 21-35 W. Water Street, St. Paul, Minn., who also handle screens of standard double crimped wire.

### Mundy Car Movers

There can be no argument about the advantage of a reliable car-mover around a plant where cars have to be spotted under spouts or hoppers, or at loading platforms, and then moved away.

The Mundy car mover here illustrated, in addition to its other advantages, has an electric motor with high starting torque, making it very rapid in its action, while the vertical capstan has proved most convenient for general work such as that around sand pits and stone quarries.

Full information can be had from the J. S. Mundy Hoisting Engine Company, Newark, N. J.

The Novo Engine Company, Lansing, Mich., has produced and is distributing a new bulletin, Number 153, illustrating and describing Novo air compressor outfits. The compressors furnished with these outfits are of the duplex single stage, single acting, vertical type, and are designed to operate against pressures up to 100 pounds. In connection with each size and style shown in the catalogue is a detailed list of tools which can be operated by it so that the purchaser can easily select the size and type best suited to his uses. A distinguishing feature of the Novo unit is the particularly efficient belt drive. It is also interesting to note that individual cooling systems have been provided for both engine and compressor and the engine can, if desired, be used as an independent power plant.

The Universal Gypsum Company has been incorporated at Rotan, Texas, with a capital of \$100,000. Incorporators: C. E. Williams, L. Ford, and J. V. Gray.

The Middle Hope Sand and Gravel Co., has been incorporated at the Bronx, New York, with a capital of \$10,000. J. E. Lynch, E. Long, and E. T. Carroll. Attorneys: Delehanty Giffin, Hannon & Evans, 15 Broadway.



# Pit and Quarry

Member Audit Bureau of Circulations

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VOL. 7

CHICAGO, ILL., AUGUST, 1923

NO. 11

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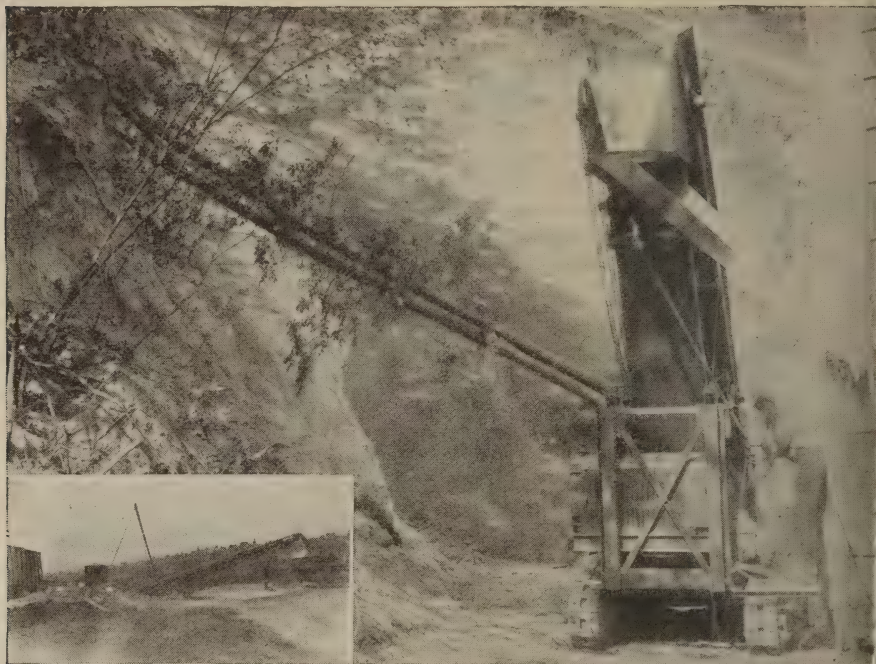
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*Barber-Greene Bucket Loader opening up a pit. At left, a Barber-Greene portable Belt Conveyor unloading cars at the rate of 16 a day as against half as many by other methods.*

## Opening up pits with a Barber-Greene

A Barber-Greene user writes us that the mobility of the Barber-Greene is one of many things in which the machine has exceeded their most enthusiastic expectations. They quit work with their Barber-Greene Bucket Loader at one pit at four o'clock one Thursday afternoon. In spite of the fact that it rained all day Friday, they moved the machine 22 miles and took 125 yards out of a new pit Saturday afternoon.

The same user says that with the Barber-Greene they start in one pit as soon as they have stripped a space twenty feet square, and go ahead with loading while stripping goes on over the rest of the new pit.

Other users frequently use their Barber-Greenes to do the stripping as well as the loading. In the installation reproduced above, the Barber-Greene was used to open up the new pit and is now loading at the rate of five yards in three minutes.

This machine is used both for loading molding sand and for loading road gravel. At one time some trees caved in but the loader got out of the way easily and early. Another user reports that he replaced a bucket elevator system with two Barber-Greene conveyors and thereby jumped up the production of washed and screened gravel from 50 tons per day to 400 tons. For additional information about Barber-Greene Bucket Loaders and Portable Belt Conveyors send for N cost reports and catalog.

Barber-Greene Company, 490 W. Park Avenue, Aurora, Illinois

*Representatives in thirty-three cities*

**BARBER GREENE**  
 Portable Belt Conveyors      Self Feeding Bucket Loaders



# Pit *and* Quarry

Vol. 7

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No. 11

## Confining A Blast

The common use of high explosives, such as dynamite, which can give fairly efficient results even when poorly handled, has lead many blasters to be indifferent in their loading methods. This has been the means of making the blasting of rock in many quarries less efficient and more expensive than it should be. In his travels of late, in visiting quarries, the writer has noticed these poor practices are followed to a great degree by a large number of blasters. It is true that some blasts that are so made can be termed efficient but this is due more to good luck than to good management.

There is an old slogan that says, "It is the little details that make the job great." This is true of blasting as it is the small details, provided the proper amount of powder is used, that makes the blast efficient and successful.

The first consideration in any blast is to have the charge at the bottom of the hole, and have it compacted in the smallest space possible. This shows the need in deep hole blasting to chamber the hole by springing. In some kinds of rock it is possible, at a small cost, so to chamber the hole as to confine the entire charge in the chamber. This will always give the best results. If, though, some of the charge must be put in the bore of the hole, the explosives should be well compacted.

All explosives should be made as compact as possible in the hole, for air spaces only help the charge to be cushioned. Miners have learned in

their shallow hole blasting that, if the bore of their hole is not filled with explosive, the air thus left in the hole may cause the charge to shoot out, just as the load does out of a shot gun, causing what they term a "mis-fire." Exactly the same results come from deep hole blasting when air spaces are left in and around the charge. The results are not as marked, as the large charge used will disrupt and throw down some rock, yet some of the force of the explosive will be used to compress the air around it and as the rock is opened up this compressed air will force up some of the charge through the hole or opening, thus having the same tendency to waste some of the force of the explosive.

It is for this reason, when dynamite is used and water is not in the hole, that the wrappers should be cut or taken off so that as the dynamite will be tamped and compacted, it will fill every crevice in the hole. This is not often done.

If a granular powder is used, several sizes of grains should be used in the same hole. The writer always made a practice of using at least two sizes of grains and, if possible, three sizes. The great trouble in this loading is to get the different sizes of powder so well mixed so as to reduce the interstices between the grains so as to make the charge a dense one. If a powder of this kind, already properly mixed, can be obtained, better blasting may be done. It is fortunate today for powder users that there is such a powder on the market.

The writer in deep heavy blasting has used to an extensive degree pat-

ented powders that are put up in bags and are even without grains, being granulated but not made into glazed grains. These powders are more easily compacted than any others without danger from excessive tamping, and, although they are not as high an explosive as dynamite, yet if used with judgment and at the proper time are just as efficient. Cheaper blasting can be done with them than with dynamite. Accurate records of the cost of many blasts have proved this beyond any doubt.

In the writer's opinion much money is wasted in blasting by the lack of knowledge among blasters and buyers of explosives. Many of these seem to think that the more powerful the explosive the better and cheaper the blasting will be. This is not literally true. The writer remembers, before the American Railway Association placed a limit upon the percentage of nitro glycerine that dynamite could contain, that many users of explosives ordered high percentages. Now that they cannot get them, they do just as efficient blasting. The writer once experimented with a lot of 80 per cent dynamite and concluded the cost of blasting was made excessive. There are many cases in blasting where, if the explosives are handled properly and used with judgment, the lower explosive is best. Just as efficient blasting is done and done much more cheaply. It would be quite surprising to some quarry operators to find out how much money can be saved by experimenting with various kinds of powder. There is an old story that a student once asked the celebrated artist, Opie. "Mr. Opie," asked the young man, "how do you mix your paints?" "With brains," was the reply of the celebrated artist. It takes brains to handle and use explosives and also knowledge of the properties of powder.

With the load properly compacted

the next question is the properly placing of the detonator. If an electrical exploder is used for this purpose it should be placed as near the center of the charge as possible, as the best results will then be obtained. If a fuse and a cap is used to explode the blast, the detonator should be put near the top of the charge. But, because of the danger of the fuse leaking and thus setting fire to part of the charge, it would also be well to place the cap near the center of the charge. But, even with the improved fuse used today, there is always some danger of a fire-leak, so that it is deemed expedient, even at the expense of a less efficient blast, to place the cap near the top.

It is needless at this time to say anything about crimping a cap on a fuse, as on page 73 of the July issue of PIT AND QUARRY the right and wrong way of doing this work was illustrated and described. One thing, though, that was not described was the proper method of placing the cap in a stick of dynamite. The proper way is to unfold the paper at one end of the dynamite and, by means of a sharp pointed hard wood stick work out a hole in the dynamite and in this hole insert the cap. The paper of the wrapper of the stick of dynamite is then gathered around the fuse and by means of a string is tied tightly. The same method can be used to insert an electrical exploder into a stick of dynamite, but a more common method is to punch a hole, on an angle, into the sides of a stick of dynamite and after inserting the cap of the exploder into this hole to take a hitch with the wires around the stick of dynamite thus secure it tightly. A cap and fuse are sometimes fastened to a stick of dynamite in this same manner by some blasters, but this is an improper method. The fuse is likely to be broken by making the hitch and thus a fire-leak can occur



and the blast set on fire before it is detonated.

After the exploder is placed in the charge the next thing is to confine the charge by stemming the hole. For this there should be provided some dry sand, or light clay or loam. As this material is poured into the hole it should be well tamped and compacted. The tamping should be carried well towards the top of the hole so as to give all the resistance possible to the force of the blast. Blast holes that are shot without being tamped seldom result in efficient blasting. Care should be exercised not to have small particles of sharp stone in the tamping material, as there is danger of these stones cutting the fuse, causing a misfire. If electrical exploders are used these stones will cut the insulation off the wires, causing short circuits.

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## Cement Association Changes

The Portland Cement Association announces the appointment of Walter B. Elcock as assistant general manager in charge of the Southeastern offices of the Portland Cement Association.

Mr. Elcock joined the staff of the Portland Cement Association in April, 1914. During 1915 he was division engineer in charge of association work in Colorado, Utah, Wyoming and Idaho. In 1916 he was appointed district manager in charge of the Atlanta office. He has been continuously with the association since joining our staff, excepting for two years spent in the army during the war as major of infantry.

Mr. Elcock's headquarters will be as heretofore at the Portland Cement Association office in the Hurt Building, Atlanta.

Association district offices have recently been opened in New Orleans, Jacksonville, Birmingham and Memphis. These offices, as well as one to be established in Raleigh, will increase the effectiveness of Association's service to users of cement and concrete in Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana.

## Slate Association Leader Dies

It is a curious working of fate that the man who offered the resolution on April 20th, 1922, making the National Slate Association a practical possibility, and who became its first President, should be the first one called to the Great Beyond.

William Henry Keenan died July 20, after a violent and unexpected prolonged acute heart attack Thursday night. He had practically and satisfactorily recovered from an appendicitis operation and was soon to have left the hospital. He seemed to have a premonition of death, because of many remarks made before going to the hospital and during the attack suffered at the Atlantic City meeting.

He was ever ready to counsel and guide others in the industry. His word once given by pen or verbally was a bond. Some men too lightly view their pledged word. He was never known to take unfair advantage of any man or to refuse to deliver slate or orders at lower levels simply because with an advancing market or larger demand the same slate could be sold at higher prices.

Born in Rutland County, Vermont, he was an ideal President because he blended the viewpoint of two major producing sections of the industry. He is survived by his brother Michael. Mr. Keenan has been actively engaged in every branch of the Slate Industry, and the properties under his direction developed into one of the largest operations producing blackboard, structural and roofing slate.

---

Shipments of cement from mills in central and northern California have greatly relieved the acute shortage existing for several weeks, and the announcement by the Riverside Portland and other cement concerns of immediate enlargement of their plants to increase production is regarded as guarantee for the future. The cement manufacturers say that in sixty days their enlarged mills will be able to supply the local demand.

---

Immense quantities of "silver" sand are being brought here from Holland. It is being shipped to glassmaking centers for the manufacture of the finest qualities of glass.

## Bins For Grab Buckets

When bins for stone gravel or sand are filled by hand, elevators or belt conveyors or even by means of chutes from screens, it matters little what design the top of the bins may be. It is generally customary to have the tops level on all sides. But when grab buckets are used for loading bins the design of the top is important, for it must be so shaped that the operator who is standing on the ground will be able to spot his bucket over any part of the bin he desires.

It is true that much rehandling of material in pit and quarry operations is done by means of grab buckets loading material directly into vehicles. In such cases bins are not used. There are numerous cases, though, where material must be elevated and dumped into the bins by means of grab buckets and at times these buckets must also be used for taking material out of the bin.

With bins designed as they ordinarily are, much stone or material that is being handled is dumped over the sides. When buckets are used for unloading material from the bins the sides of the bins are frequently broken and torn by the heavy grab buckets, as the operator must do a lot of guessing in spotting his bucket over the material as he picks up a load.

All of these things can be prevented by changing the design so that the top of the bin is lower on the side toward the operator. In order to make the bin hold the same amount of material it is necessary to increase the height of the opposite side. It has been found that for bins for twenty feet or less in width that to cut the sides down six inches for each foot of width from the center and raise the opposite side six inches for each foot of width from the center, allows the operator to see the bucket in the bin at all times and to know if he is spotting it correctly.

Thus for a bin twenty feet wide the side towards the operator would be five feet lower than the center and the opposite side would be five feet higher than the center. The ends would conform to this slope. Such a bin would have the same capacity as though made level from the center.

For bins of more than twenty feet in width it has been found that to cut the sides four inches for each foot of width is sufficient to allow the operator to see his bucket. If material is to be dumped entirely by gravity in the bin, the bottom of the bin in order to clear all the material, should be built hopper shaped, but if material is to be taken by gravity from the bottom of the bin and also grab buckets are to be used to empty them, the bottom of the bins should be made flat. This will allow the greater part of the material to run through the bottom gates if that is desirable and the sides and ends can be cleaned up with the grab bucket. In hopper bottom bins the hopper bottom will not allow the grab bucket to take the last material out as it will not be large enough to allow the bucket to operate in it without tearing the sides to pieces.

Thus it can be seen that, when grab buckets are used in connection with bins, the latter should be designed differently than when such buckets are not used. The writer has called attention to these facts in articles some years ago, but recently in his travels he has seen many operations where these facts were not known or, if known, were ignored. Therefore it seems wise again to call attention to the thing that means the saving of money. It seems that each generation must learn certain facts for themselves.

Webster County, Iowa, will probably own one or more of its own gravel pits in a short time if plans being carried out to purchase pits are completed.



## Maintenance Experiment

### Gravel Company Keeping Up Seven Miles of Road in Its Own County

The Greenville Gravel Company, Greenville, Ohio, is doing a really serviceable piece of work for its own county, and incidentally, for the gravel industry generally, by taking over the maintenance of seven miles of one of the principal highways in Darke county, the county in which Greenville is situated.

This company graded and drained the roadway at its own expense and is now giving this road full time maintenance with washed gravel and will continue this work at its own expense for five or six years. The first year was recently completed and the result was so striking that not only did the officials of Darke county take up the idea as a general plan, but the officials of other counties in western Ohio made pilgrimages to Darke county to see this road, and as a result the idea is being put into practice in many other places.

Mr. F. D. Coppock, president of the company, has recently written a booklet describing the work the company is doing in this respect and is having a large number of these pamphlets printed for distribution.

In regard to the material which should be used for this work, Mr. Coppock says:

"Next in importance to drainage and the proper preparation of the road bed, is the character of the material which is placed on the road. Present-day traffic requires a different material than formerly. Experience has already taught engineers and those boards and officers having charge of road maintenance that the old methods are inadequate and impractical. The past two years have clearly demonstrated the imperative need of not only adequate drainage and good road beds but of high class material in order to avoid the almost impassable road conditions that we have had during the thawing season of the past few years.

"The average bank-run or pit-run gravel, as found in local deposits and commonly used, has been proven unfit for use in road maintenance. These deposits do not run uniform in coarseness or quality. Very often they contain too much sand; always too much

loam; and at times, too many boulders, which renders the material unfit.

"Sand and loam create dust, prevent drainage, and retain moisture. In thawing seasons dirty gravel becomes very soft because of the moisture it contains. The old idea, that repair gravel should be mixed with loam in order to make it pack quickly, is an erroneous one. Repair gravel should have no loam whatever in it. Clean gravel will pack without hindrance to traffic if properly applied and maintained.

"Boulders or large stones are very objectionable, as they are inclined to work to the surface, causing an expense to remove and also creating bumps which in turn cause chucks.

"In road construction the gravel used should be clean and uniform in its mixtures of various sizes from sand to pebbles not larger than  $1\frac{1}{2}$  inches. At least twenty-five per cent, but not to exceed thirty-five per cent of fine sand  $1/10$  inch down should be mixed with the gravel for road construction. A proper sand mixture prevents the sub-soil from coming up through the gravel, which is apt to happen under heavy traffic, at the same time an excess of sand is undesirable. Where a partial rebuilding is needed, or where the road is so nearly worn out that a light surface treatment is not sufficient, a clean gravel should be used, ranging in size from sand to  $1\frac{1}{2}$  inches.

"For maintaining the average gravel road the material should be that of a very fine gravel without sand. A washed and screened pebble ranging in size from  $1/10$  to  $1/4$  inch has proven satisfactory; preferably a pebble from  $1/10$  inch to  $1/2$  inch. Never use larger than  $3/4$ -inch pebbles. This should be applied in very thin layers as required. Each application should be a little more than enough to absorb all the worn-out particles of mud and soil on the surface of the road. There should at all times be a loose thin coating of this material on the road surface. The dragging of the road will move this loose material back and forth, filling in the low places as they occur and keeping the road smooth at all times.

"The reason why a fine gravel is better than coarser material for a road dressing or surface is that if larger particles are used the process of dragging will pull the larger stones loose from the surface, making it rough and impossible to keep smooth."



Plant of E. T. S

## Excessive Rains Hinder But Good Output of Materials Maintained at Louisville

By Our Louisville Correspondent \*

With the exception of the interference that has come through excessive rainfall for the season, business is moving along very nicely both with the crushed stone people and in the river sand and gravel business. Rains have interfered both with road work and with general construction and prevented fulltime work and a full measure of progress all around; but incidentally it has brought some relief by making help a little more plentiful. And another relieving factor is a better supply of cars.

The rains have brought a fairly flush tide of water to the river but this has not been any serious handicap to the progress of river digging operations, and on the whole the sand and gravel concerns here have been very busy of late. Those prominent in river sand and gravel operations here are the E. T. Slider Co., with yards in Louisville and across the river to New Albany and also a plant down the river at Lockport; the Ohio River Sand Co., and the Nugent Sand Co. All three of these are along the water front in the upper part of town and they are all busy at this writing.

The Ohio River Sand Co., reports that they are not only busy in their river work but they also are busy at local delivery and have a good run of carload shipments going to different points in the territory.

This is pretty much the story all around, and fortunately for the carload trade there is improvement in the railway situation and plenty of cars are available now.

The better situation in the matter of cars and transportation is helping out in quarry operations too, but quite a lot of the quarry work of the day is now centered on and coupled with road contract work.

This is illustrated by the doings of the R. B. Typer Co. They are operating four crushing plants now, all of them in connection with road work and road contracts. They are not operating their big crushing plant near Louisville for commercial work because so far there has not been enough promise of business to encourage opening it. There seems to be a fair share of railway business with plants out in the state, and it is the railway ballast work and the road contracts which overshadow all other factors in quarry and crushing operations at the present time.

The outlook all told is for a busy and prosperous summer run both in the quarries and crushing plants and among the sand and gravel operators.





sville, Ky.

## Output of Abrasives in 1922

The output of grindstones and pulpstones in the United States in 1922 amounted to 26,524 short tons, valued at \$1,020,186, according to figures reported by the producers to the Department of the Interior through the Geological Survey. These figures show an increase of less than 1 per cent in quantity and a decrease of 17 per cent in value.

The grindstones produced amounted to 21,367 short tons, valued at \$574,900, an increase of 31 per cent in quantity and 20 per cent in value.

The pulpstones produced amounted to 5,157 short tons (1,619 pieces) valued at \$445,286, a decrease of 48 per cent in quantity and 41 per cent in value. The demand at paper mills, which were very active late in 1920 and early in 1921 and which during and after the war could not renew their supply of English stone, increased the market for domestic pulpstones in 1921, but the depression that followed this activity caused a decrease in the output of pulpstones in 1922.

The grindstones were produced in Michigan, Ohio, and West Virginia and the pulpstones in Ohio and West Virginia.

The imports of grindstones and pulpstones were valued at \$49,993, as against \$81,880 in 1921. The exports of grindstones were valued at \$281,413 as against \$281,976 in 1921.

According to reports of producers to the Department of the Interior through the Geological Survey, the production of scythestones, oilstones and whetstones, rubbing stones, and hones in the United States in 1922 amounted to 1,016 short tons, valued at \$197,450, an increase in output over 1921 of 22 per cent in quantity and 14 per cent in value. These products are manufactured from stone quarried in Arkansas, Indiana, Kentucky, New Hampshire, Ohio, and Vermont.

The sales of emery increased 1,163 tons, or 381 per cent, in 1922, and the average value increased to \$11.93 a ton, as compared with \$7.38 in 1921. There was a corresponding increase of 131 per cent in the quantity of abrasive garnet sold in 1922. The average value of the garnet per ton, however, dropped from \$85.53 to \$80.36.

There was 35 per cent more pumice sold in 1922 than in 1921, and the average value per ton was \$3.75, or 52 cents less.

The output of grinding pebbles and tube mill lining increased 196 per cent and 331 per cent, respectively.

The sand and gravel pits of J. U. Loftsgordon, Burke, Wisconsin, have been leased by the Waukesha Washed Sand and Gravel Co. This new company in Madison, will be known as the Madison Washed Sand and Gravel Co. Equipment, estimated to cost \$50,000, will be installed.

## Tractors For Pit and Quarry Operations

The old type of steam traction engine was found useful for many purposes but, being long coupled and high in build, could not be used to advantage over rough ground and on steep slopes. The use of caterpillar traction was found to be an improvement but, with the advent of the gasoline and oil motors, new designs were brought out so that the modern tractor is short connected and of low build.

This allows it, especially with caterpillar traction, to operate in rough ground, over steep slopes and make sharp turns. Thus the use of tractors has been wonderfully increased and today many industries find that one or more tractors are a decided asset.

This is true of the pit and quarry industries, for tractors can be used for a number of different operations. These uses will not only be as tractors, but also as power plants to operate different kinds of machines.

Thus, if a tractor is not being used for hauling and some temporary pumping has to be done, the engine can be connected to a pump by means of a belt and thus a pit could be unwatered. In the same way a wagon loader can be operated and stone rehandled. Most loaders are equipped with engines or motors, but these machines can be bought for less money without a motor, and it is for this type that the tractor can be used.

A high power tractor can also be used for operating a small auxiliary crusher, or for a screening or washing plant to advantage. At times a small air compressor is needed and the tractor can be brought into use for this. A small portable saw mill can also be operated by a tractor or a rotary saw for cutting up cord wood. By this means, if logs are available, ties for tracks can be sawed out and

heavy timbers and planks produced for towers, bins, chutes and even buildings. In this way timber that would otherwise go to waste can be saved and put to use.

As many sand and stone producers own large acreages and use some parts for farming, raising feed for their horses and mules the tractor can be used to operate feed cutting and grinding machines. For a farm a tractor has become almost a necessity, but that is another story.

For quarries and sand and gravel pits a tractor can be used for stripping to advantage. If a steam shovel is employed for the excavation, a tractor with two or three heavy dump wagons can be used for hauling the overburden away. It is also possible to use a train of two wheeled scrapers behind a tractor for excavation, and in place of the two wheeled scrapers a train of four wheeled scrapers will be found economical. A tractor can also be used for moving a steam shovel from different parts of the operation.

Tractors can likewise be used for hauling sand and gravel from the bank or pit to the washer or grading plant, using engines or trailer cars. Stone can also be handled to the crushers in the same way. Some tractors can be used on rails for hauling cars by changing the wheels from traction to regular railroad wheels.

In some cases tractors can also be used with wagons or trailer cars for delivering products to the customer. For long hauls, through large towns and cities, the automobile truck is cheaper and also quicker.

A tractor with a road machine can also be used in making and maintaining roads to and from the operation.

These remarks show the great variety of uses to which tractors, can be put, and those who have never used them should at once look into their merits.





View of Plant of Ballina Sand and Stone Company.

## Producing Gravel and Crushed Gravel

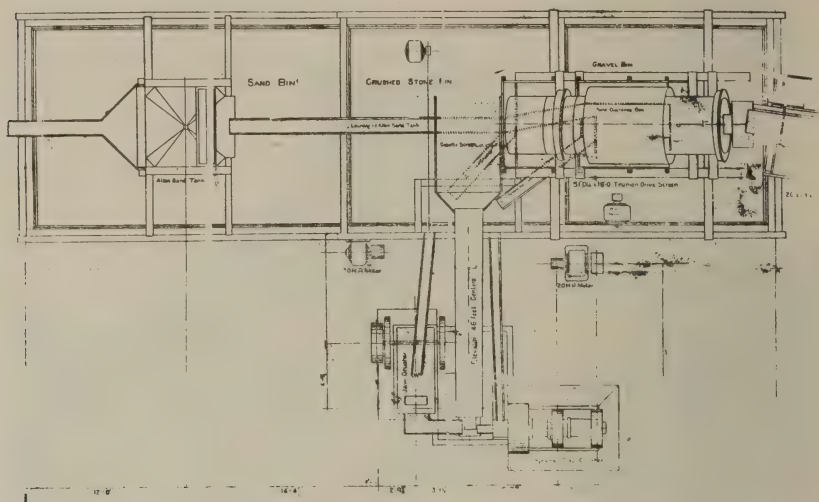
**T**HE Ballina Sand & Stone Co., an enterprise owned and operated by the McCain Realty Co., Syracuse, N. Y., is an up and coming concern that bids fair to an important position in the gravel production activities of the section that it serves. Located some 25 miles from Syracuse, it is able to reach that big center and a number of others where the demand for sand and gravel is considerable.

The deposit which the company is working extends over 10 acres and contains good materials to a depth that makes possible the maintenance of a working force 60 to 70 feet in height. The gravel is of good quality, analysis showing it to be very clean material and tests for road building purposes indicate that the strength, toughness and wearing qualities are sufficient to make it desirable for road building purposes.

The material is excavated and con-

veyed to the plant by a  $1\frac{3}{4}$  yard power drag scraper manufactured by L. P. Green of Chicago, Ill. This piece of equipment is operated from a Lambert hoist and draws its power from a 125 horse power Primm oil engine located in the hoist house. From this point on, the general plan of operation calls for dumping the scraper load over a grizzly into a hopper from the bottom of which it is taken up by a belt conveyor to the plant proper. Discharge from the belt conveyor is into a large rotary washing screen. Large sizes are dropped to a disc crusher or a jaw crusher, the product from which is carried back by elevator and introduced into another screening process. The sands are passed on to the sand tank which performs the office of washing, dewatering and grading the materials.

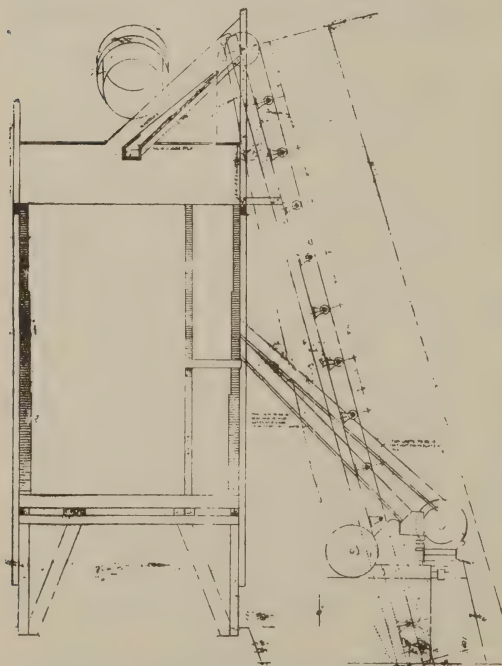
The Green scraper is arranged to operate at a radius of 300 feet. The



Plan view of plant of Ballina Sand and Stone Company

hoist is located a little back of the receiving hopper toward the plant and to the right of the conveyor, looking at the plant from the front. The mast

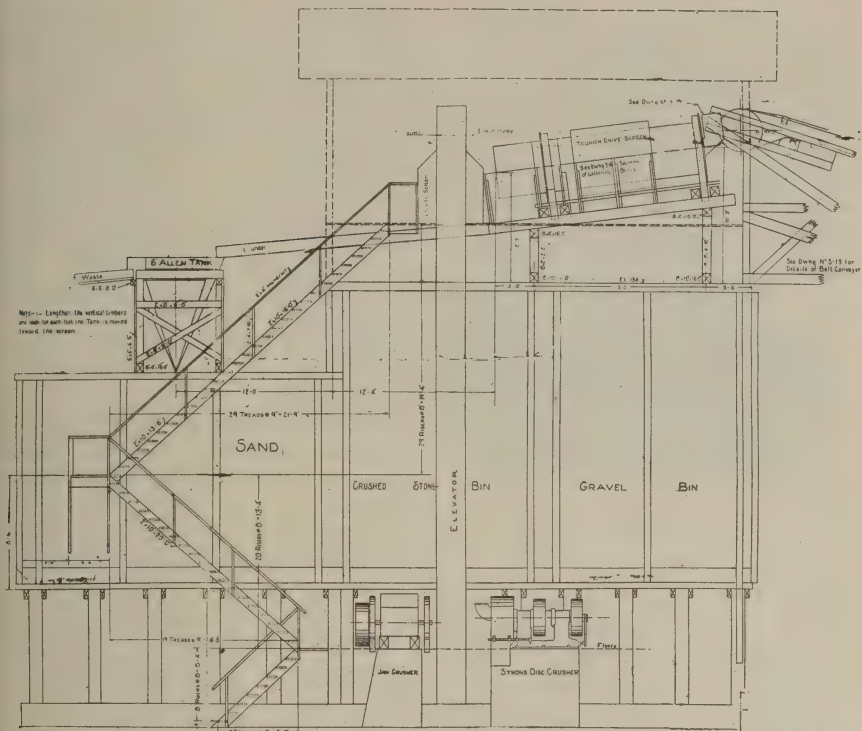
will be located at various points around the outside of the hopper, so that the hopper will always be between the mast and the ground over which the scraper is working. Thus when the digging is straight ahead the mast will be at the back of the hopper, when the digging is to the left and forward the mast will be toward the right and back. In this way it will be possible to make the scraper excavate in all directions from the hopper, except directly back of it, thus leaving only the spot of ground on which the main conveyor is built. When all the material within the 300 foot radius is exhausted the hoist and scraper can be located further afield and a field conveyor installed to bring the sand and gravel to the plant.



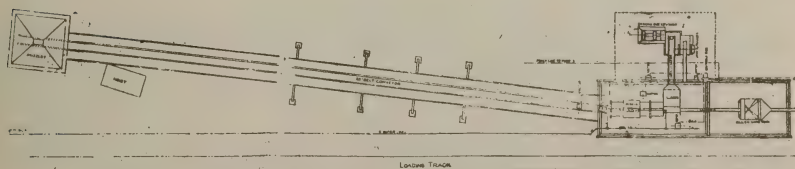
End view showing elevator and rotary and gravity screens

The 20 inch belt conveyor which supplies the plant with materials discharges at a 16 foot trunnion drive screen, 51 inches in diameter, surrounded at the middle section by a sand gathering box. This screen is driven by a 15 horsepower Burke





Side elevation showing flow of materials



General layout views, plan and side elevation



View showing facilities for loading trucks and cars

motor which transmits its power through a belt and spur and bevel gears. The elevator is operated by a 10 horsepower motor, a Burke as are all others through the plant.

Gravel that passes the screen is chuted directly to gravel bins, the stone that is too large to pass the rings is sent to the crushers, and the sand is sent from the gathering box to a 6 foot Allen cone through a launder extending over the crushed stone and sand bins.

Gravel that is too large for chuting directly to the bins is separated into two grades and passed as separate materials to one of the two crushers, the crusher to which it drops being determined by the size of the material.

Minus  $1\frac{1}{4}$  inch gravel is dropped to a Symons disc crusher and all over  $2\frac{1}{4}$  inches goes to a Champion jaw crusher. The products of both these crushers are spouted to the boot of a bracket elevator, 46 feet between centers, which carries the crushed gravel to the top of the plant and discharges at a gravity screen located at the end of the 16 foot rotary screen. This screen makes a separation of two stone sizes which drop into special crushed stone bins from where the products are drawn off and sold as crushed gravel.

This practice of keeping the crushed material separated from the regular run of graded gravels is one that is not endorsed, or, at least, not followed by the majority of gravel producers. The merit of the plan could appear to be determined to a considerable degree by the amount of material that requires crushing and the consequent production of quantities large enough to be commercially important or too small to be bothered with. In the case of the Ballina Sand and Stone Company there is sufficient large material requiring crushing to justify the separation of the crushed product from the regular run of material and this crushed stone forms a valuable part of the plant's output.

As described above, the Allen cone is supplied with sand by a launder running from the sand gathering box to the cone. Arriving at the cone the sand is thoroughly washed and the wash water is passed to a short waste



Panoramic view showing plant, deposit and track system



flume which conducts it to a pipe dropping directly down at the end of the plant. This pipe carries it to the creek from which the water is secured in the first place.

After washing, the sand is drawn off at the bottom of the cone and passed to the sand bins as a clean, washed product. The company contemplates the installation of another Allen cone at some time in the future to take care of the fine sands that will run off in the waste water from the single cone. Provision has been made for this addition and it will be necessary only to move the present cone nearer the screen, thus leaving room at the end for the second cone. When the first cone is moved forward it will be raised 1 inch for each foot moved, so that the carefully calculated inclination of the launder will remain unchanged.

By the way the term "launder" will be an unfamiliar one to many sand and gravel operators who are accustomed to call the trough in which water is run a "flume". Launder is defined in Bureau of Mines publications as "a trough, channel or gutter, by which water is con-

veyed; specifically in mining, a chute or trough for conveying powdered ore, or for carrying water to or



Green power drag scraper excavating the sand and gravel



Looking up the main conveyor; hopper and bar grizzly in foreground

from the crushing apparatus." In this particular case the term is in very good use, although the specific set of

conditions under which it is operating are not mentioned in the Bureau of Mines definition.

Water for the washing operation, introduced at the point where the sand and gravel enter the rotary screen, is supplied through a 6 inch pipe by a 5 inch Gould pump which sends it from a creek 1500 feet from the plant.

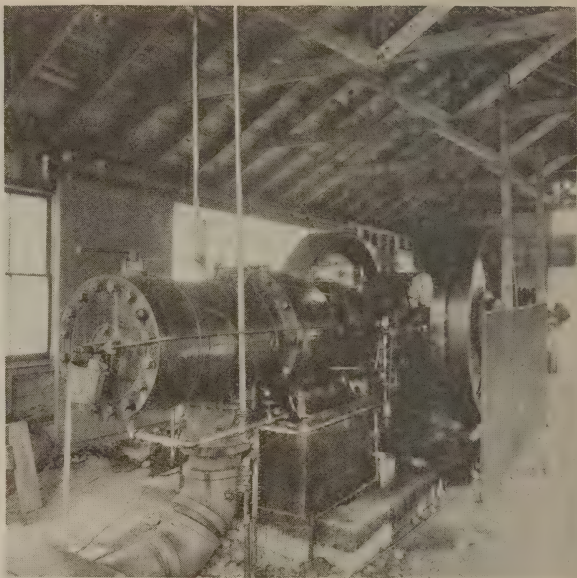
The plant was designed for car and truck loading and has quadrant bin gates extending over the railroad track alongside and clam-shell bin gates over the space underneath into which trucks will run to be loaded. These gates are products of the Smith Engineering Company of Milwaukee, Wis.

The plant which has a capacity of 1000 yards per 10 hour day was designed by Edmund. Shaw, consulting engineer, Chicago, Ill. Mr. Shaw has laid out a plant that comes up to the best expectations of the owners and is producing steadily a large volume of well washed and graded materials.

Most of the equipment, including the elevator, conveyor, screens and jaw crusher, was furnished by the Good Roads Machinery Company of Kennett Square, Pennsylvania.

### Miscellaneous Uses for Waste Slate

Waste slate fragments may be utilized to some extent for sidewalk stone, building stone, and fence posts, states Dr. Oliver Bowles, mineral technologist of the Department of the Interior, in Bulletin 218 of the Bureau of Mines. As slate presents an exceptionally satisfactory surface for painting, the use of waste slabs for



The Pimm oil engine which operates the hoist

sign boards merits consideration. Slate waste has been tried as railroad ballast, but the tendency for the flat fragments to slide on each other results in instability and gradual flattening of the grade. Consequently there is no prospect of finding any extended field of utilization in railroad work except possibly in the use of the larger massive fragments. Slate pulverizes to dust too readily for a road surface, but it may have some value in road construction when applied to the lower courses.

The Missouri Public Service Commission has ordered new freight rates on agricultural limestone varying from advances between certain points to as much as thirty-five per cent. Witnesses from the Missouri College of Agriculture and a number of other Agricultural Associations appeared before the commission to ask for a rate reduction.

Construction of the first unit of what will eventually be one of the largest plants for the manufacture of gypsum products in the Southwest will be started at Sweetwater, Tex. in the near future. When completed the plant will represent an investment of \$1,000,000.





A considerable impression has already been made upon the deposit by the scraper



Giving an idea of the character of the deposit



## 21 Plymouth Locomotives Owned

The Morris County Crushed Stone Co. of Morristown and its subsidiaries are one of the biggest producers of stone in the country.

In 1915 Mr. F. W. Schmidt, President (who is also President of the National Crushed Stone Association), bought the Plymouth Locomotive. Repeat orders followed until now. Plymouths take care of their haulage burden.

Read the letter in adjoining panel—then write us YOUR haulage problem and we will send you interesting literature.

**The Fate-Root-Heath Co., Plymouth,**





## Morris County Crushed Stone Co.

MORRIS COUNTY CRUSHED STONE CO.  
MORRISTOWN, N. J.

Millington, N. J., June 27, 1923.

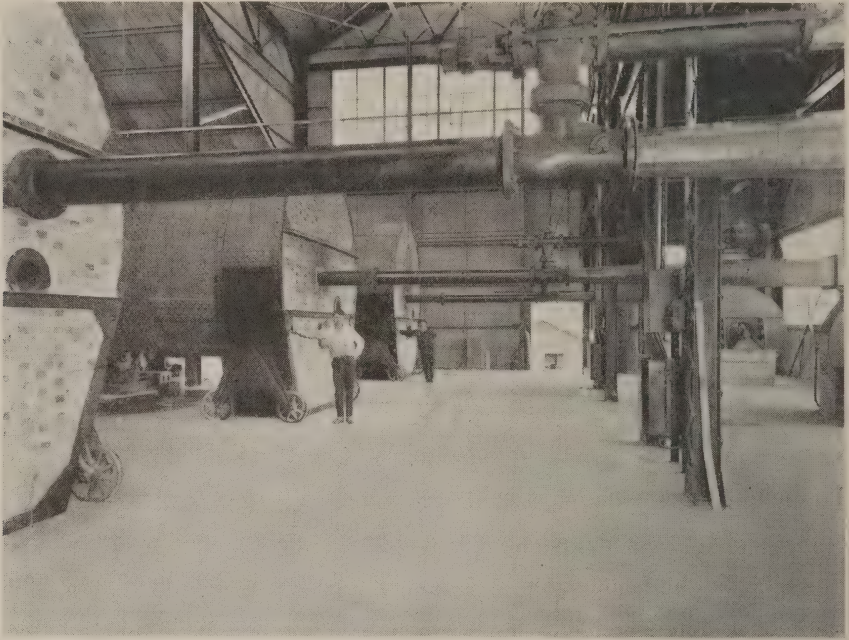
The Fate-Root-Heath Co.,  
Plymouth, Ohio.  
Gentlemen:

We still have in operation the first Locomotive we purchased from you in 1915. This Locomotive is still doing its bit, which speaks pretty well for your machines.

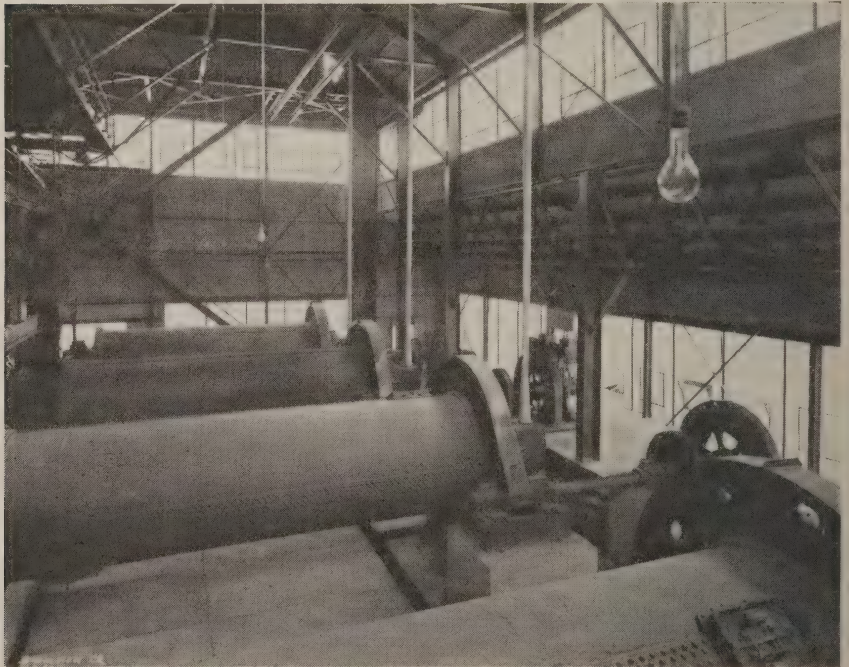
One of the principal reasons we use your Gasoline Locomotives is because the average youth can be taught to run them efficiently in a very short time, whereas with the Steam type it is necessary to employ a licensed engineer. Gasoline Locomotives are also much more flexible than Steam in quarry operations.

Another reason is the comparative low initial cost and the slow depreciation.

Yours very truly,  
MORRIS COUNTY CRUSHED STONE CO.,  
By F. W. Schmidt, Jr.,  
Superintendent.



Showing three of the 10x150 Vulcan kilns.



These four 7x26 Traylor tube mills do the fine grinding.



## New Phoenix Portland Cement Plant at Birmingham

In October of last year, work was begun on Plant Number 2 of the Phoenix Portland Cement Co. at North Birmingham, Ala. Two months ago that plant produced clinker, and three weeks after the production of the clinker was turning out finished cement; surely a construction record of which the Phoenix Co. can well be proud. The plant is now close to the production of its full capacity of 5000 barrels a day.

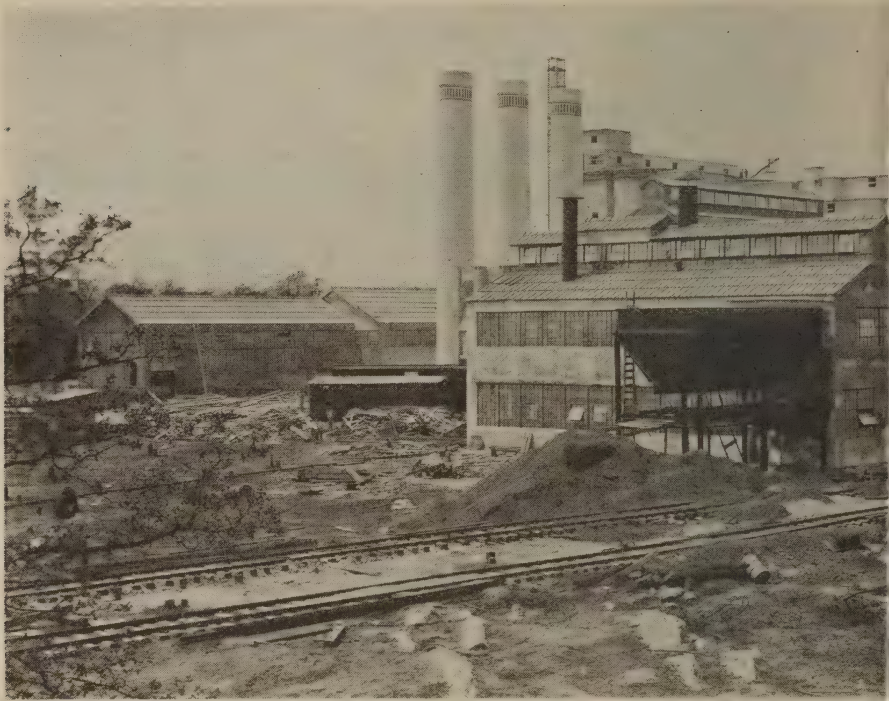
The new operation is a "dry" plant. By the employment of the dry method manufacturers hope not only to accomplish the assured saving in fuel that comes with this method, but to produce a product that for uniformity of analysis will be equal to any cement that has ever been produced by the wet method.

The mill buildings are modern in every way and embody the best and most improved features of present day construction. All buildings are constructed of steel and reinforced concrete, with roofs of cement tile. Ample space has been left for storage purposes and the installation of handling facilities. Other general observations on the plant are that it is operated entirely by electricity, that each piece of machinery is, as far as possible, driven by a separate motor, that units are operated individually and driven so as to be independent of other units. Another desirable feature of the plant is its closeness to good transportation. It is situated at North Birmingham, on the main line of the Louisville and Nashville Railroad and connects to the Belt Railroad with all the trunk lines entering Birmingham. It is close enough to Birmingham to be able to draw upon that city for its labor supply. The plant is only a half mile be-

yond the city limits and 5 miles from the business section of Birmingham.

Close by the mill is the limestone deposit, from which is secured stone of uniform composition and with an analysis that makes it a very desirable cement material. There is hardly any overburden to be disposed of, and this feature will, to an extent, reduce the cost of stone production. At the present time, a 40 foot face is being maintained in the quarry. From this 40 feet is secured a stone that analyzes high in the limey constituents required in cement raw materials. Under this 40 feet of rock that analyzes high in lime is another stratum that extends down to a depth of 70 feet, and contains a natural cement rock, a stone practically identical in composition with the cement rock found in the Lehigh district of Pennsylvania. The stone from the higher level will, of course, require the addition of clayey materials to make a cement mix. The clayey materials will be supplied in the form of shales secured from nearby deposits. The Phoenix Company is thus well off for raw materials.

At the present time quarry operations are being carried ahead at a rapid rate. Drilling is being done by two Cyclone well drills made by the Sanderson-Cyclone Co. of Orrville, O. Ingersoll-Rand No. X70 drills are being employed while the work of opening up the quarry is being done. Just about all the blasting will be done in holes drilled by the well drills after the quarry has been opened. The formation makes the use of this equipment the most profitable and generally desirable. Blasted material will be picked up by 2 No. 30 Marion crawler type full revolving shovels electrically operated. By means of these shovels broken rock is loaded into 8 ton cars



This is how the Phoenix plant looks

of all-steel construction, built for 32 inch gauge. These cars are products of the Eastern Car & Construction Co. of Easton, Pa. Cars are handled by a General Electric storage battery locomotive and by a 15 ton Davenport steam locomotive.

Loaded dump cars are pulled to the ground level along an inclined trackway by a drum hoist manufactured by the S. Flory Manufacturing Co., Bangor, Pa. A 100 horsepower General Electric motor of slipring type is used to power this hoist.

When the rock reaches the crusher house it is dumped from the side of the cars by means of a hoist and cable operating a hook that tips the car sideways. The rock falls to a 36 inch Superior crusher made by the Worthington Pumps and Machinery Corporation of New York City. After the rock is acted upon by the crusher it is

discharged at the bottom of this machine and is picked up by a 42 inch Link Belt Conveyor. This conveyor carries it to a hammer mill made by the Pennsylvania Crusher Company of Philadelphia. Material passed by the hammer mill is sent by a chute directly to one of a number of covered storage pits over which runs the tracks of a traveling electric crane. Two 8 ton cranes furnished by the Champion Engineering Company of Columbus, Ohio, are mounted on the craneway which has a span of 80 feet and a length of 400 feet. The craneway runs over all the pits, the two cranes dividing up the work by handling what is to be done at either end or working together near the same point. The cranes are equipped with 3 yard clam shell buckets which pick up the crushed material and pass it direct to





short time before it was completed

the weigh or mixing bins which are located on the other side of the plant.

The limestone is thus quickly prepared for mixing with shale and going through the raw grinding process. The shale, too, is procured and processed without particular difficulty. It is quarried about a mile from the plant, at Lewisburg, Ala. from a large deposit of this material which has characteristics that make it very desirable from the cement maker's point of view. One of these characteristics is that the deposit contains both high silica shale and low silica shale. By varying the proportions of high and low silica shale the manufacturers get a material that fits in most conveniently when making the mixture with limestone. Quarrying at Lewisburg is simplified by reason of the fact that there is no overburden.

The crushing of the shale is done at

the pit by a 13 inch gyratory crusher and by rolls. This equipment is furnished by the Traylor Engineering and Manufacturing Company of Allentown, Pa. After reduction the shale is passed by elevators and belt conveyors to reinforced concrete storage bins of 200 tons capacity. These bins are elevated on concrete pillars and underneath them run the loading tracks along which standard gauge equipment owned by the company is drawn for overhead loading. The railroad connecting the shale pit and the mill is owned by a railroad company and only the equipment in which the shale is carried is the property of the Phoenix Company.

Arriving at the mill, the shale cars are run on tracks paralleling one side of the storage bins. The cars dump through hopper bottoms into a hopper pit which conducts the shale to a point

inside the crane runway, from where it is picked up by the clam shell bucket of the crane. The crane then passes it to one of three 800 ton concrete storage bins or direct to the mix bins.

A 36 inch Schaffer poidometer, manufactured by the Schaffer Engineering and Equipment Company of Pittsburgh is used to forward limestone in correct quantities to the mixing operation. A 20 inch Schaffer poidometer passes ahead the shale. The flars from these two continuous weighing devices come together at a 24 inch pan conveyor made by the Link-Belt Company of Chicago. The function of this last piece of equipment is to elevate and convey the cement making material, now weighed out in correct proportions to the drying operation.

Drying is done in two 7x70 foot vulcan dryers, made by the Vulcan Iron Works of Wilkesbarre, Pa. At the feed end of each dryer precaution is taken, after the material has been introduced to settle out all dust, thus reclaiming valuable material which would otherwise, by getting into the air, become an annoyance. It may be said in passing that the Phoenix Company has spent over \$100,000 to insure as much as possible against a dusty condition in the plant as a result of chimney discharges. The reclamation of dust in the driers is done by large reinforced concrete dust chambers, lined with fire brick which were designed and constructed by the companys construction force.

The dryers are fired by pulverized coal blown to the machines from the coal crushing plant in somewhat the same manner as that in which coal is supplied for the kilns.

After the drying operation has been completed the mixed limestone and shale is ready for the raw grind. The machines for the raw grind and the finish grind are all located in the same building. Each of the processes, the raw and the finish grind, has four

separately operated and controlled units. Thus a break-down in one of the units does nothing more than to slightly curtail production, where other arrangements might mean practically stopping it. The raw grinding units can also be used for finish grinding and the finish grinding for raw grinding. Preliminary grinding is done by four gear driven Bradley Hercules mills, products of the Bradley Pulverizer Company of Allentown, Pa. Flexible couplings connect these mills directly to 300 horsepower General Electric motors of the slip ring type.

The total grinding capacity of the raw and finish grind machinery is 12,000 barrels per day. An advantage of being able to use the raw and finish grind machinery interchangeably is that it is thus made possible to put in the full effort at the work that is most necessary at the time, whether that be to prepare material before or after it has been in the kiln. A double system of conveying machinery makes it possible to divert the material flow quickly from the regular channel and route it in the direction where the greatest advantage is secured.

After the preliminary raw grinding has been done in the Bradley Mills the material goes to 7x26 foot tube mills manufactured by the Taylor Engineering and Manufacturing Company of Allentown, Pa. Each of these mills is charged with 55 tons of 1¼ inch Cylpebs and is driven through a 60 inch magnetic clutch by a 500 horsepower General Electric synchronous motor. The magnetic clutch is a product of the Cutler-Hammer Company of Milwaukee, Wis.

After the raw material has been ground to the required fineness it is carried over to the blending silos, five reinforced concrete storage bins of 2000 barrels capacity each. These silos are 65 feet in height and 17 feet in diameter. The reason for their being called blending silos will be seen later.



These structures are parallel to the grinding units and are close to the mill building. They were designed and built by the McDonald Engineering Company, who specialize in the solution of storage problems around cement plants.

At the bottom of each of these silos is a Link-Belt rotary feeder which, governed by a control that is operated at variable speeds, will give any desired amount of material from any particular bin. It is thus possible to draw off materials with an eye to their various analyses, to mix the contents of the various bins in just the proportions desired. The chemical properties of the contents of the several bins are, of course, determined by analysis at frequent intervals.

The kilns, products of the Vulcan Iron Works of Wilkesbarre, Pa., are 150 feet long and 10 feet in diameter. They are fed by screw conveyors and fired with pulverized coal. Drive is by individual motors and each kiln is also equipped with a fan which runs from an individual motor.

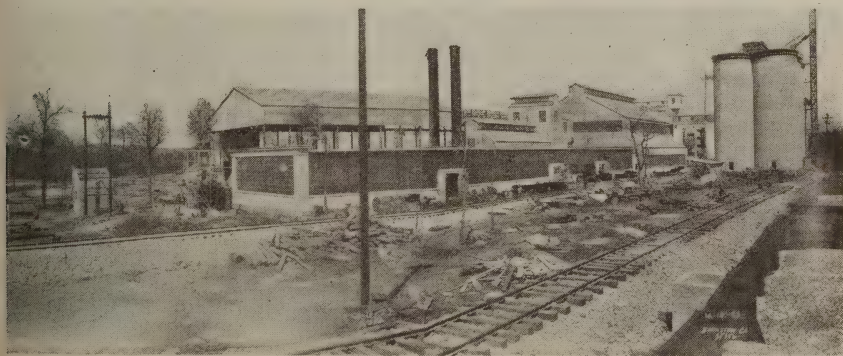
After the calcination process has been completed and the clinker carried to the low end of the kiln it is dropped upon a pan conveyor which discharges at the craneway pits. From here it may be transported through a 24 inch pan conveyor to a 15x15 foot concrete hopper or may be stored for future use.

The clinker is then passed to the finish grinding operation, either directly or by way of the storage. The finish grind is conducted as previously described under the subject of raw grinding. The preliminary work is done by Bradley Hercules mills and the final reduction by Taylor tube mills.

After the finish grinding department has produced the ground cement, this product is carried to the 6 reinforced concrete cement silos which, with the two interspaces created by the two rows of three bins, give a total storage capacity of 110,000 barrels. These silos are 84 feet in height and 32 feet in diameter.

Beside the silos is the packing house. Here 4 Bates packers, made by the Bates Valve Bag Company, are supplied from the silos with cement for bagging. Along two sides of the packing house run belt conveyors which carry the bags of cement directly to cars on the loading tracks. Loading track facilities are sufficient to accommodate 60 loaded and 60 empty cars.

A 198x48 foot bag house is located beside the packing house. Ample space is thus provided for the repair, cleaning and storage of a large supply of bags. Close to the packing house is also a 25x60 foot trucking station in which may be stored sufficient bagged cement to take care of the local truck trade without interfering with the loading of bags into cars.



Showing machine shop, stone storage, dryer building, mill building and finish silos

Link-Belt silent chain drives, manufactured by the Link-Belt Company of Philadelphia, are used throughout the plant on the individual motors driving elevators, conveyors, dryers and kilns. The crusher furnishes the only example around the plant of a machine driven by a belt. Everything else is powered through Link-Belt drives or is directly connected to its motor.

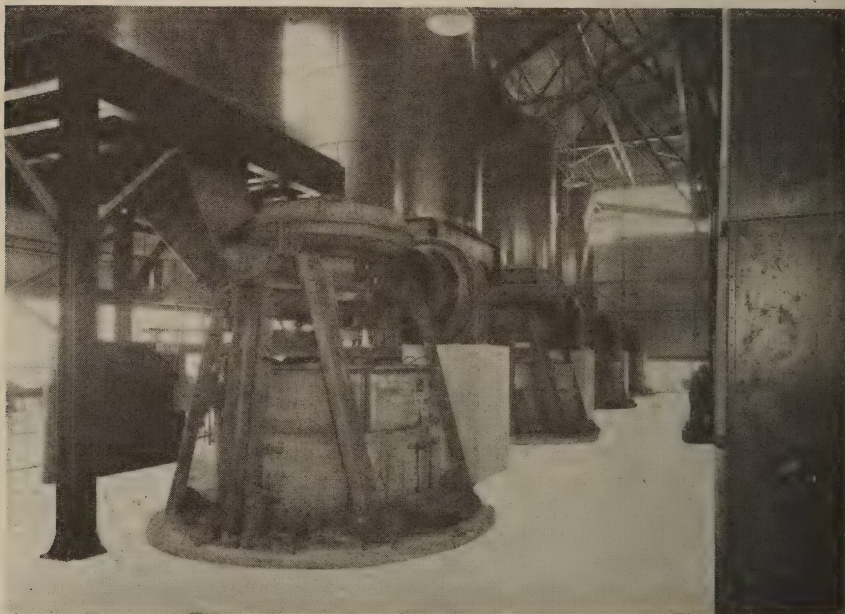
Two Ingersoll-Rand air compressors furnish air under pressure for various purposes around the mill and quarry operations. One of these compressors, delivering 620 cubic feet, will be relied upon to do most of the work. The other, with a 320 cubic foot capacity, will serve as a standby.

Air will be used to pump the coal for the kilns and dryers. The Fuller-Kenyon system of pumping coal has been installed. The coal is reduced to a pulverized condition by three 42 inch gear driven Fuller mills supplied by the Fuller-Lehigh Company of Fullerton, Pa. The coal grinding department is located in a separate building.

In another building, 50x260 feet, are located the switchboard and store-room, together with the blacksmith and machine shops. In another building, the same that houses the air compressors, are the transformers, which steps part of the current down to 2300 volts and part down to 440 volts. In the switchoard room are 2 General Electric rotary converters which supply the direct current for the kiln motors, magnetic clutches and electric cranes.

An interesting feature of the plant is the method of equipping the feed end of each kiln with a large chamber which settles and reclaims all the dust. Each is 70 feet long, 30 feet wide and 40 feet high and is built of reinforced concrete lined with fire brick. The chambers have hopper bottoms under which are screw conveyors to carry the dust back to the raw silos.

The 3 reinforced concrete kiln stacks, 103 feet in height and 8 feet in diameter, were built by the Weber Chimney Company, of Chicago.



Four Bradley Hercules mills, used for preliminary grinding



The kiln dust chambers were designed by the Rust Engineering Company of Birmingham and were erected by them. The Austin Company of Cleveland, Ohio, erected the machine shop building. The Merrick Scale Co., of Passaic, N. J., furnished weightometers. The roofing came from the American Cement Tile Company of Pittsburgh. The Walsh and Weidner Boiler Company of Chattanooga built and erected the storage bins. While construction was going on a 15 ton locomotive crane made by the Orton and Steinbrenner Company of Chicago was used for a variety of purposes. This piece of equipment will now be utilized chiefly for transferring coal from the cars to storage bins at the coal grinding plant.

## Blasting in Crushers

IN a large number of quarries where the largest types of primary crushers are used, it is a practice, when a large boulder chokes the crusher, to use dynamite either to break up the boulder or to dislodge it so that the crusher will take a bite upon it and thus break it up and pass it through. This is generally a quick method of disposing of the boulder and it is often the means of saving much time and keeping the crusher up to the standard of production.

The charge used is generally small, seldom exceeding over a pound of dynamite, and in many cases is less. Such blasting may be done only a few times a week, while in some cases charges may have to be put off hourly, depending of course upon how large the boulders are and the way in which they enter the crusher.

There are but two alternatives to this method of blasting. One is the use of levers or bars to pry up the rock and put it in such a position that the crusher will break it. The other is to use sledges to break the rock, or at least break off some points.

Both of these methods are generally slow. But they have one advantage over that of blasting and that is that there is no great danger of injuring the crusher.

The practice of blasting in the crusher is to be generally condemned. There is always a slight danger that workmen will be injured by pieces of rock flying from the blast, and there is always danger of injuring the crusher. Even if the crusher is not actually broken, yet the excessive jar or concussion, due to the blast, does not do the crusher any good, and in course of time will weaken it.

In large gyratory crushers concaves can be cracked due to the breaking of the boulders by the blast. These concaves may not be so injured as to fall out or have to be replaced immediately, but if continual blasting is done, many of the concaves will have to be renewed. Heads can also be broken and even spiders. In large jaw crushers the chances of injury are not so great. But, even in such crushers, some damage can be done.

It is hardly to be expected that those operators who are now using this method of blasting will cease to do so at a word of warning. It seems advisable to call attention to the practice, so that those who are not doing it may not begin, and that those who are following it will try other means of dislodging boulders in some cases.

The Clinton Sand and Gravel Co., Clinton, Ill., has been incorporated with a capital of \$10,000. The company expects to produce sand and gravel on a large scale, and with the possibilities of road construction in that vicinity for the next several years, it is assured that there will be no limit to market demands.

The Pekin-Springfield Gravel Company, Pekin, Ill., has just begun operations. The plant will fill 75 cars of gravel in an 8 hour day and the amount of orders now on hand will keep them running at high speed for several weeks.

## Good Call for Material

### Prices Firm With No Evidence of Immediate Change

(By Our Pittsburgh Correspondent)

The advent of real summer weather shows no marked change in sand and gravel operations in the Pittsburgh, Pa., district. The producers are active on the rivers and there is a healthy call for material. Not only is there good local buying, but different river points occupied by the various iron, steel and affiliated industries are showing up well in the line of current production and distribution, and heavy hauls are being made.

Prices are firm and give no evidence of any immediate change. The high cost of production is a matter of established fact that the producers must meet, and there is certainly no trend to lower wage scales. Best washed gravel is finding a good volume of takers at the waterfront at \$2.00 a cubic yard. The price on the float holds at \$1.60, while deliveries are being made at a proportionate higher rate, depending upon the destination.

First grade river sand maintains at \$1.00 and \$1.10 f.o.b. float, with dock deliveries quoted at \$1.50. Large quantities of material are now being distributed throughout the city and nearby points and there is not much opportunity for any great accumulation of stocks.

Local supply dealers are also finding a ready sale, with gravel, retail, at \$2.50 a cubic yard and upwards, and sand at close to the same figure. There is no hesitancy in stocking up at the prevailing wholesale levels. Portland cement is in good demand at the supply yards, with price at \$3.50 a barrel, less bag credit of 10 cents each. Wholesale, cement is bringing \$2.24 a barrel.

J. K. Davison & Brothers have had six new barges constructed at the works of the American Bridge Co. Two of these recently were launched and the other four will be ready at an early date. The floats will be placed in service immediately to handle the output of the sand diggers on the Allegheny River. The company is keeping its entire fleet in service and will continue on this basis for an indefinite period.

The West Virginia Sand & Gravel

Co., Charleston, W. Va., has been running into a little ill-luck recently with its river steamers. Several weeks ago, the "Mary Jane" sunk in the Big Kanawha River, and the company called on the Pittsburgh market, chartering the steamer, "Robert Jenkins," of the National Transportation Co., to replace the lost vessel for towing sand and gravel from points on the Ohio River to Charleston. Early in July, the last noted steamer went hard aground near Point Pleasant, but without serious consequences. The steamer "Mary Jane" is being raised and will be taken to the docks for rebuilding. The company is maintaining activities at a high point.

The Keystone Sand & Supply Co., has recently opened its new plant at Munhall on the Monongahela River, and is now making shipments by rail from this point. The new plant is expected to facilitate operations to a considerable extent and will be kept in active service. The entire floating equipment of the company is busy on the river and large loads of sand and gravel are reaching the local market. The company has the dredge "Frankfort" busy at Freedom, where a new harbor is being dredged.

The Iron City Sand Co., finds business keeping its full fleet in service, and the steamer "P. M. Pfeil," has been hauling heavy floats of sand and gravel for distribution. Equipment that has been laid up for repairs recently is now ready and will be placed in operation.

The steamer, "Atha" of the Crucible Fuel Co., has been taken to the marine ways at Elizabeth, where the steel hull will be scraped and painted, and the vessel otherwise placed in first class shape. This company has been very active with its fleet on the river.

The Lincoln Sand and Gravel Co., Springfield, Ill., must bear the entire expense of the construction and maintenance of an interlocking plant at the crossing of the single track of the Illinois Traction System at the company's plant near Lincoln, according to an order handed down by the Illinois Commerce Commission July 5.

The Atlas Rock Co. has just been incorporated at Oakdale, Calif. with a capital of \$150,000. Machinery ordered from the east will make possible a minimum output of 40 tons daily.



## Is Standardization Enough?

By WILLIAM GANSCHOW,

President William Ganschow Company

We are all familiar with the efforts that have been made in the past few years by engineering societies, manufacturers' associations, and even the United States Government, toward the standardization of numerous common items to manufacture.

That standardization is the solution of a great many troubles, and the only method of eliminating great amounts of expensive dies, tools and machinery, is no longer questioned; *but is standardization enough?*

A great percentage of the users of mechanical equipment, while expert in its use, are entirely unacquainted with the terms to be used in specifying duplication of many of its parts. How many operators of a steam dredge, a coal elevator, or electric pump—or any other machinery—could state correctly the necessary data to obtain the replacement of, say, a gear? How many operators could specify pitch, diameter, shape of teeth, etc.?

To be sure, they should be able to refer all their troubles to the builders of the machine, but the practice which is growing constantly more universal, of buying such parts as gears, clutches, pulleys, governors, speed transformers, etc., from other manufacturers, has not only resulted in the use of many different types of "accessory" equipment, but has confused the builders' records—if such records are kept.

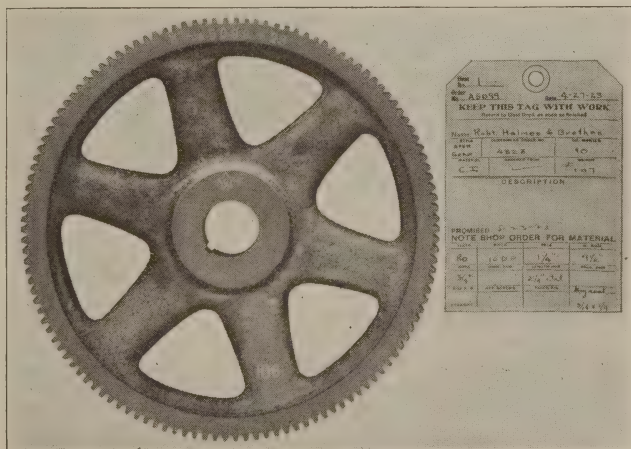
We are all familiar with the markings on "Byers" pipe, showing size and date of manufacture. In the automotive field, it is comparatively simple to obtain replacement parts by the use of model numbers. Other equipment, such as pumping machinery, carries serial numbers which refer to a particular specification on file with the maker. There are, however, many kinds of commonly used articles which are more or less difficult to specify correctly and which

are perhaps most often purchased "outside" by the builders of machinery units. Gears are perhaps the most commonly used and the least understood by the average operator, and few gears are now marked intelligibly so that replacement parts may be ordered with real assurance of correctness.

Realizing from past experience, that the marking of gears meant the elimination of a great deal of trouble, the William Ganschow Company, pioneers in the cut gear field, have adopted the practice of marking on each gear not only their trade mark, but also a production number upon which the gear was manufactured and the date of its manufacture. (See illustration).

Aside from the convenience which such marking affords in re-ordering, it has the effect of inspiring confidence in the manufacturer; first, because it shows that he has confidence enough in his product so that he is willing to put his trade mark upon it; and, secondly, it shows that he has faith enough in its durability to invite the comparison of its length of life with that of similar articles, affording the user an accurate means of checking its period of use from the dating which it carries.

The William Ganschow Company, always alert to anything that will impress the quality of their material upon the user, have adopted this method of marking, knowing full well that unless it is to be derogatory to their established reputation, each gear must maintain the Ganschow reputation for quality.



## Reorganize Department

### New Ohio Highway Director Assumes Charge

By Our Cincinnati Correspondent

The Ohio State Highway Department under direction of its new director, Louis A. Boulay, recently appointed by Governor A. V. Donahey to succeed Leon C. Herrick, is undergoing a reorganization this summer which includes a number of innovations in plans and procedures. Mr. Boulay is a big, square shouldered engineer, and hopes above all things to leave a real impress upon the highway situation in Ohio. As has been often published, the Highway Department of Ohio for a number of years has furnished fuel for many political fracas, and Director Boulay believes that troubles in his department will be obviated by less secrecy in highway matters in the future. To disarm suspicion in Ohio road work the new director plans to keep material men, contractors and engineers, informed on all new developments of construction. One of his largest tasks is the reformation of the maintenance end of highway work. This is a policy dear to the heart of Governor Donahey. The Governor has believed that in many instances more cheaply constructed highways purposely have been neglected to disgust the public with anything but the most expensive construction.

Mr. Boulay himself is not a general cheap roads advocate. He believes that the benefits of better highways can be brought to more localities and that more miles of highways can be constructed for less money, but he does not favor building cheap roads in all parts of the state. It is alleged by many of the producers of road materials in Ohio, who have proclaimed themselves in accord with the new director's plans, that Mr. Boulay's ideas in his road programme will seek to give all road interests an even chance and as equitable a division of the state's appropriation as any past administration has ever offered.

Production and distribution of basic materials in the Cincinnati district are not more than regular, a summer dullness having set in many instances. The past unprecedented building

boom reached its peak some weeks ago, and building progress has somewhat retarded. Local roadwork is at a standstill, except in sporadic instances of contracts calling for repairs. Prices are most favorable and conducive to all construction work, and it is evident that labor scales and other contributing causes are lessening current building programmes.

Prices on materials continue as from last month. Washed gravel sells at \$1.50 a ton f. o. b. cars, sand, \$1.20 f. o. b. cars, cement \$2.99 a barrel; and lime is quoted at the market price of \$16.80 a ton. Adequate supplies of all materials are at hand, although with the present price scale there is no hesitancy in buying.

J. Cornell, manager of the Red Bank Gravel Company continues to operate their three plants daily. The Red Bank Gravel Company has been fortunate to secure the bulk of the contracts calling for materials used in the city concrete roads under construction in a few of the outlying districts. The company is digging a good grade of sand, and has made a number of improvements recently. One of their operations is employing a new Erie Type B steam shovel, and has changed to a three inch electric pump. A well has been sunk near one of the pits, and the concern has changed over to the new water supply, cutting down the overhead in the former use of purchased city water.

F. E. Hall, head of the T. J. Hall Co. reports that the company's production of river sand the past thirty days has been about the same as the total of last month. The low stage of the Ohio river has contributed largely to the success of the latest production. Mr. Hall asserts that prices will probably remain the same for the coming period, and adds that in all events they cannot possibly drop to lower levels.

The Dugan Concrete Company of Cincinnati is anticipating a big spurt beginning in the fall. Mr. Dugan continues the full programme of diggings, although the more or less dormant summer demand is present. The efficiency of the plant having been increased by means of the new hoists and conveyors installed the fast spring, the Dugan Concrete Company is storing good supplies in preparation for the Fall demand.



## Study of Western Fluorspar Deposits

Results of an examination of the various Western fluorspar deposits made by R. B. Ladoo, mineral technologist of the Department of the Interior, are set forth as follows in Serial 2480, just issued by the Bureau of Mines:

With one exception, all of the deposits worked have been so small, or so far from transportation, or contain fluorspar so mixed with silica or barite or both, that profitable production of gravel grade of fluorspar, acceptable to eastern steel mills under present standards, has been impossible, and the future seems no more promising. There are two small mines which would yield a few hundred tons annually by screening hand-picked ore, but from present indications, these properties do not justify the erection of mills.

With only one exception, the most accessible ore from the mines which have been worked has been removed. The mines are for the most part, in poor physical condition, and future operations will be increasingly difficult and expensive.

Most of the western mines have long and expensive hauls to railroad, and the ore bodies are too small to justify the cost of installing improved methods of transportation, or modern mining and milling equipment.

The production of acid fluorspar west of the Mississippi River from ore bodies now known probably will not exceed 100 tons annually. It is believed that not over 3,000 tons of ground fluorspar can be annually produced, of which one-third will be low grade.

It was estimated that the properties visited in the western states can produce for a few years a maximum of 13,000 tons annually of a grade of gravel analyzing on an average 5 per cent or higher in barite, and a maximum of 4,000 tons of fluxing lump. The western steel mills, on account of the difficulty of obtaining fluorspar in gravel form, have been accustomed to use in their open-hearth furnaces both lump and gravel. The estimated consumption of the western mills is 10,000 tons annually, and they will probably continue to utilize western fluorspar on account of the high freight rates applicable to the Illinois-Kentucky product.

## U. S. G. Breaks Record

### First Half of 1923 Was Best Period in History

In sales, earnings and tonnage the United States Gypsum Company for the first six months of the current year has exceeded all previous records in its history, according to S. L. Avery, president.

Mr. Avery was optimistic. The plants of the company are operating at capacity and the outlook is good.

"It is the conviction of our sales department that sales will continue at their present rate for at least the remainder of this year, and from indications now they may run higher and beyond that period."

"The farmer," continued Mr. Avery, "is slowly getting back on his feet. Our sales in the South and Southwest are good with the exception of the Northwest. That territory, due to severe competition and the conditions of the farmer is the only soft spot in our organization. Still the farmer there is slowly improving."

The semi-annual earnings probably will be announced on or after August 1 following a meeting of directors.

## Talc Mine Should Have Adequate Reserves

For the successful operation of a talc mine enough prospecting should be done before a mine is opened or a mill built to prove a large tonnage of talc of marketable grade, states R. B. Ladoo, mineral technologist, Department of the Interior, in Bulletin 213 of the Bureau of Mines. Probably 200,000 tons is a minimum safe reserve on which to start operations; 500,000 tons would be much better. Unfortunately, few companies in the past have done, adequate prospecting; after some mills were built not enough talc was available to keep them running. When a definite tonnage has been blocked out and a mine opened, it is equally important that prospecting and development be continued so that a large supply of ore may always be blocked out in advance of actual mining.

The Threewit-Cooper Cement Co., Denver, Colo., has been incorporated with a capital stock of \$50,000.

## Lower Freight Rates

### Believe I. C. C. Will Arrange for Downward Revision

By Our Washington Correspondent

Those persons in Washington close to the administration believe that freight rates throughout the United States are destined for further consideration and possible downward revision by the Interstate Commerce Commission. Indications are that the subject will come before the commission for discussion within the next month or six weeks. No formal announcement of whatever plans the commission may have has been made and none is likely until some definite action is taken. Moreover, the commission, cognizant of the greatly improved condition of the carriers as a whole, of the unusual volume of business handled at the present time and during the past few months, and of the excess earnings of a considerable number of the stronger roads, is carefully studying the entire rate fabric as a preliminary to deciding what proceedings should be inaugurated to revise rates. The preliminary study may result in no action whatever. On the other hand, it holds the possibility of resulting in another—and probably small—reduction in rates generally. The difficulty, however, in the situation is that such a reduction would apply to the weaker roads as well as the strong. If it were simply a question of fixing rates on the basis of the earnings of some of the big roads, there is little doubt that a reduction would be ordered now. If such a general reduction is made sand, gravel, stone and other building materials probably will be included.

Rates on cement shipments moving entirely within Illinois and within Indiana were declared by the Interstate Commerce Commission to be unduly preferential to producers in those states and to constitute a discrimination against shippers in Hannibal and St. Louis, Mo. Railroads were ordered to file new schedules by October 12 carrying rates no greater on interstate shipments than are charged on shipments within the states for equal distances. The commission also found that cement manufacturers at Hannibal and St. Louis, Mo., and Buffington, Ind., were entitled to slight rate reductions in shipments to Illi-

nois points, while manufacturers at Hannibal also were held to be entitled to similar reduction on shipments to Indiana points, and the railroads were ordered to make the prescribed changes. The new rates must be based on distance, the commission said, and be not in excess of 7 cents per hundred pounds for distances of 20 miles, ranging up to a maximum of 21½ cents for distances of 700 miles.

Definite designations of roads to comprise the Federal-aid high system have been made in 34 states by the Department of Agriculture. These roads, and estimates in the 14 states where roads have not yet been approved, aggregate 187,406 miles, connecting nearly every city in the country having a population of 5,000 or more. Indications are that more than 90 per cent of the nation's population will live within 10 miles of a Federal-aid highway. In some states it will be as high as 98 per cent, according to department officials, and in none will it drop below 65 per cent. Mileage by states where designations have been made is: Arizona, 1,498; California, 4,467; Colorado, 3,360; Connecticut, 835; Delaware, 266; Florida, 1,855; Idaho, 2,772; Indiana, 3,957; Iowa, 7,154; Kansas, 6,423; Kentucky, 3,250; Maine, 1,393; Maryland, 1,036; Michigan, 4,582; Minnesota, 6,801; Missouri, 7,040; Montana, 4,697; Nebraska, 5,500; Nevada, 1,456; New Hampshire, 988; New Jersey, 983; New Mexico, 3,358; New York, 4,498; North Carolina, 3,816; Ohio, 4,506; Oregon, 2,814; Pennsylvania, 3,954; Rhode Island, 165; Utah, 1,430; Vermont, 1,043; Virginia, 3,016; Washington, 2,887; West Virginia, 1,901; Wyoming, 3,234. Estimated mileage in states where designations have not yet been approved is: Alabama, 3,958; Arkansas, 5,037; Georgia, 5,662; Illinois, 4,987; Louisiana, 2,667; Massachusetts, 1,290; Mississippi, 3,290; North Dakota, 4,855; Oklahoma, 7,889; South Carolina, 3,179; South Dakota, 8,077; Tennessee, 4,564; Texas, 11,655; Wisconsin, 5,516.

Surplus war material which the Government refused to sell at junk prices is being used in road construction to great advantage by the states to whom the material is transferred, according to the Bureau of Public Roads. At the end of the war there was left unused over a half-million pounds of rough castings of spare parts for one of the well-known makes of motor trucks. They were badly



rusted and on casual inspection might have been condemned as worthless junk, but it was found that the necessary machine finishing entirely removed all rust and pits. A small offer for the entire lot was made but was not accepted. A few months ago the State Highway Department of North Carolina accepted a portion of them as part of its share of surplus war material for use in road building. Surplus war machinery was used for finishing the parts for use in trucks also received as surplus war material. The finished parts are worth about 75 cents a pound as compared with an offer of 1 cent a pound for the parts in rough. Other states have followed the example of North Carolina and the entire supply has been taken up and will be put to useful service.

## The Policy of Repairing Machinery

Machinery used in pit and quarry operations has very severe handling and is required to do gruelling work. The result of this is that there are many break-downs, and repairs must be frequently made. Break-downs on such machinery are not only expensive, but to the cost of the extra parts and of the labor, but also to the fact that the entire operation may be held up for hours, and sometimes days. It is thus imperative that accidental breaks be prevented as far as possible, all of which brings up the subject of the policy of making repairs.

In doing this work every operation should have some kind of a shop. The extent of the operation must guide those in charge as to the kind and size of shop needed. In every case, though there must be some wood working machinery and tools, a well equipped blacksmith shop, and a machine shop. There must also be kept on hand a kit of tools that can be carried from shop to those machines that must be repaired in place. It must be understood that a few hundred dollars, or even a few thousand dollars so invested can quickly pay dividends by making it possible to accomplish quick repairs. When large gangs of men are idle for a few hours, or put on work that does not mean production in order to keep them busy while repairs are being made, it is a great loss of payroll money. If this waste is reduced by having facilities for making

quick repairs the money so invested would prove good business.

Quite recently the writer saw an entire quarry force idle, or doing but little work throughout the day because of the fact that there was not an acetylene torch on hand. The money lost that day would have paid for an entire outfit. This is true in too many cases, and it shows the importance not only of having the proper tool for making repairs, but also for making these repairs promptly.

There can be two general policies in making machinery repairs. One is to make such repairs as may be absolutely necessary, consuming as little time as possible in the work. This method is one that does not anticipate any accidents. At the same time, unknowingly to the operators, it is a frequent cause of the accidents that are not expected.

The other policy provides not only for taking care of break-downs as they happen, but of inspecting equipment from time to time to search out defects, find danger points, and have repairs made before the break-downs actually happen. This policy presumes a general overhauling of old plants from time to time. To pursue such a policy as this and maintain maximum output of the plants may mean having on hand not only spare parts of machines, but also some duplicate machines and equipment. While some of the equipment is in the shop spare parts of machines may be used in their stead and no time is wasted.

A large number of operators pursue the first policy for a variety of reasons. The chief of these is that it is often difficult to keep a master mechanic and a crew of men under him to make repairs. Another reason is that it requires additional capital to have on hand spare machines such as motors, cars, drills and like equipment ready to be used as substitutes during break-downs. Most business men like to operate on as small a capital as possible. A third reason against this policy is that there appears constantly on the books a large expense account both for material and labor for making such repairs—much larger than when only temporary repairs are made.

Those items are all readily shown on the books either as capital invested or as expense, and though they may appear large, they are frequently small as compared to those items of expense or loss which do not appear on the books. They run into thousands of

dollars. Such hidden expenses are those brought about by the loss of time, and the curtailments of sales.

These expenses or losses are most difficult to estimate, though they occur frequently and often add so much to the cost of production that a profit cannot be made. This is best illustrated by some examples from actual work.

A large quarry was originally equipped with machinery and equipment of good make. The machines were not only well built, but were properly designed for the work. Large production was attained, but for more than a decade only temporary repairs were made. Seemingly everything was in fair condition, but after a ten year period the production was only half of what it once had been, due to frequent break-downs. The repair bill was also exceedingly large. On one occasion a car that should have been repaired so that it would latch up properly was finally reduced to such a condition that it frequently dumped its load while in motion. This had happened a number of times without any serious results, but one day when the car accidentally dumped as a result of its faulty mechanism, the dinkey hit one of the large rocks before the train could be stopped, breaking a cylinder, and was derailed so that the entire operation was held up for some hours while the wreck was being picked up and the dinkey taken to the shop to be repaired. This was a large item of real expense, yet only a small part of it actually appeared on the quarry books.

To continue the story, in the face of their previous experience the operators latched the car up and used it as it was for some days, when again a load was dumped and several cars were derailed. Thus a second wreck had to be picked up while the crusher was idle. This loss likewise did not appear on the books, yet the production fell greatly at a time when there was a great demand for stone.

In the same quarry several large steam shovels were worked. One had an armoured boom, the timbers of which became so worn and crushed that the boom did not work true. The same was true of the crowding engine. Still the shovel was kept at its work. Finally the crash came and it was necessary to buy a new boom. It was then found that the engines on the boom also had to be replaced, making a very expensive repair job. The old boom repaired promptly would have saved

much of this expense, and the consequent loss attending the repairs.

In another case the cylinder of the Corliss type engine was so injured that a slight leak of steam showed. Still the engine kept going and doing its work. The operator promised himself that this would be repaired when a favorable occasion enabled him to do it. This was put off from day to day, until the leak became so bad that the engine would not furnish enough power to run the machinery. Then something had to be done, and there was an expensive repair bill and a cessation of production. This was due to that policy of only making emergency repairs.

In one large quarry, after some years of operation, where only temporary repairs had been made during the time of operation, it became necessary to rebuild the plant, and to buy some new equipment. In another case the greater part of the plant fell down, and it was necessary to spend thirty thousand dollars to rebuild it, consuming some months of time, while repairs could have been made for less than one fifth of this amount some years before.

Thus the two methods or policies of making repairs have been contrasted. The policy that the writer would recommend would be that of inspecting machinery at frequent intervals and of compelling all operators of machines to report at once any defect or any part of their machine that did not work smoothly. As soon as such reports are made any temporary repairs that are possible to be made should be attended to at once. In the case of more serious break-downs, as with cars or dinkeys, another should be substituted and permanent repairs made at the shop.

Idle time such as nights and Sundays should be used to make repairs to crushers and other machines that must be in constant use and to which substitution cannot be made. The fact is that at least once a week all machinery should be gone over, bolts and nuts tightened, bearings adjusted, grease cups cleaned out and packing renewed. If these things are done accidents will be prevented. It must be remembered that a machine is intended for use not abuse.

If a plant is not run during the winter an excellent opportunity is thus given to go over all the machinery completely and put it in first class condition. It is at this time that improvements should be made.



## Heavy Cement Demand

### Some Mills Have Hung Out "Help Wanted" Signs in Ef- fort to Keep Up with Market

Cement mills in the Lehigh Valley section of Pennsylvania are keeping as close to maximum production as is possible and every effort is being made to have shipments of like order. The call for material is very heavy and has grown in volume to a point where some of the smaller mills are refusing to accept orders for anything like reasonable delivery. The demand is about equally divided between building construction and road work.

The labor situation is fairly satisfactory and while all available men are being pressed into service, there is no embarrassing shortage. A number of mills have the "Help Wanted" sign out, but are doing nicely with the present operating quotas. Wage schedules show no change and the recent advance seems to have effectually checked any dissatisfaction on the part of the men. Farmers in this section are out after more workers, but can hardly offer the hourly basis as now operative at the mills.

The railroads are succeeding in furnishing an ample supply of cars, of which the majority are finding their way to eastern destinations. The Ironton Railroad, which handles large quantities of material, is having some of the busiest months in its history. Motor trucks are still being used in large number for deliveries to Philadelphia, and other reasonably nearby points.

The different plants are making an effort to create reserve stocks for the months to come, a desire that has been current for some time past but which has been practically impossible up to the present time. A number of mills still have storage quarters bare, but under the present daily maximum output there is hope for an early allotment for this purpose. As the year matures, it is expected that the demand will slacken, allowing an opportunity to close down, where desired, for necessary machinery repairs. At the immediate moment, this seems next to impossible.

The Phoenix Portland Cement Co.,

Nazareth, Pa., is running full at its local mill, with close to normal working force. Sizable shipments are leaving the plant and incoming orders insure heavy production for months to come. The company has recently placed its new mill in the Birmingham, Ala., district in service, and expects to develop maximum output at this plant in the near future. It has a capacity of about 1,500,000 barrels a year, and is the first plant of its kind to be operated in the immediate vicinity of the city. The mill has been in course of construction for a number of months past.

The Atlas Portland Cement Co., Northampton, Pa., is continuing production at its local plant, as well as at the branch mill at Coplay, in this same district. Large orders are on the books and no interruption in operations is anticipated for some time to come. The different plant units are employing close to their regular working quotas. The company is concluding negotiations for the purchase of the plant and business of the Western States Portland Cement Co., Independence, Kan. Upon acquisition, it is proposed to continue the operation of the mill as a branch plant. It is reported that the company contemplates extensions and improvements in the property to increase the present capacity.

The Lehigh Portland Cement Co., Allentown, Pa., has advanced operations at its different mills and is developing maximum output at Ormrod and West Coplay. The Fogelsville mill is also active. The company has been forced to curtail production at its New Castle plant, owing to a restraining order secured by residents in this section, claiming that their property was being damaged by dust from the mill. The trouble is caused, it is stated, by a new type of waste heat consumer recently placed in service, and every effort is being made to eliminate the difficulty. It is expected to resume operations on a regular schedule at an early date. The mill has extensive orders on hand and delays in production at this season are extremely costly.

The Lawrence Portland Cement Co., is operating at its Northampton and Siegfried mills under a heavy schedule and large shipments are leaving the plants. The Whitehall Cement Mfg. Co., is active at its mill at Cementon, as is the Bath Portland Cement Co., at Bath. The Coplay Cement Mfg. Co., is running full at its Coplay mills.

The Universal Portland Cement Co., Universal, Pa., has taken title to a tract of 231 acres of land in this section, including the site of its present mill and considerable adjoining property, heretofore held by the Carnegie Steel Co. The valuation of the property as indicated by the deed is \$3,462,500. Both companies are subsidiaries of the United States Steel Corporation, and it is understood that the transfer has been made to facilitate operations.

The Universal company is operating at full capacity at its local plant, with regular working force, and has scheduled a large volume of orders ahead.

The Security Lime & Cement Co., Baltimore, Md., is active at its mill at Security, near Hagerstown, Md., utilizing a large percentage of the production in the Baltimore district. In order to secure the necessary working force, a large number of foreigners are now being given employment. Extensions and improvements have recently been made at the mill.

The Clinchfield Portland Cement Corporation, Kingsport, Tenn., has purchased a tract of property about 20 miles from Macon, Ga., and has plans under way for the erection of a large cement plant on the site. The initial unit will consist of a number of buildings, including power plant, pumping plant, machine shop and other mechanical structures and is estimated to cost in excess of \$500,000, with machinery. It will be equipped for a capacity of about 2,000 barrels of material per day. At a later date it is expected to construct another plant unit which will more than double this output. The works will be equipped to use the wet process system and wherever possible individual motor drives will be used for the equipment. It is planned to award building and machinery contracts at an early date, and proceed with the work. John A. Miller is president.

The Guadalupe Portland Cement Co., San Francisco, Cal., has been chartered under state laws with a capital of \$3,000,000, to construct and operate a cement manufacturing plant in this section. The new company is headed by Frederick G. Cartwright, Esben Broe, Leo J. Pope and Robert Dunlay. It is represented by Boswell F. King, Humboldt Bank Building, San Francisco.

## Selecting Quarry Cars

One consideration in selecting cars for pit and quarry operations is whether or not the cars shall be constructed of wood or steel. There are advantages and disadvantages of each kind of construction.

In a discussion of this kind it is not the desire of the writer to talk against any particular make of car or to injure in any way a manufacturer, but rather to discuss in a general way the economic features of wooden and steel cars. Fortunately most manufacturers build cars of both materials.

Some years ago cars for these purposes were built almost entirely for hand loading. When steam shovels began to be used in quarries naturally the cars designed for hand loading were used in connection with steam shovels and under the rough uses they quickly went to pieces and were put by as junk. This was especially true of all steel cars which were of very light construction. At the same time few operators had much of a repair shop, in fact but little more than a blacksmith shop, so that they were not able to make many repairs on these steel cars. For these reasons the writer favored some years ago a wooden car. For stone handling he favored a wooden car lined with steel. Such a car, even in a blacksmith shop, if the trucks were still in good shape, could be almost entirely rebuilt, while the all steel cars were difficult to repair.

With the coming of the large machines, not only for loading products but also for crushing, washing and screening, the car manufacturers during the past decade have entirely revolutionized industrial car-building. Many new types have been developed and cars have been designed and built to carry large loads and stand hard and rough uses. Another factor that enters into this proposition is that pit



and quarry operators have found it necessary to maintain considerable of a repair shop, so that repairs can be made promptly to any machinery, and this has allowed them to maintain almost any kind of a car in first class working order. Thus it is no longer necessary to select cars for quarries with a view of keeping them in repair. Today cars should be selected for the kind of material they are to handle, the method of loading them, the method of dumping them and the capacity desired.

There are many all steel cars that will give long life even for heavy rock handling, for they are built of heavy castings and large gage pressed steel shapes that are not easily dented or bent out of shape. This is illustrated by the fact that many side dump cars now have the sides or doors made of steel and although large rocks continually hit them as the cars are dumped, yet the life of these doors is many times that of wood.

Just as the steel car has been improved so has the wooden car. Experience has taught that heavy hard wood protected by steel plates give long life and are easily repaired. For this reason many flat bottom cars still have their bottoms or this construction. For rock work it is not advisable to use wood in the construction of cars without having it heavily armored. Even for hand loading this is necessary.

Wood is used for cars that are built square, but when curved shapes are desired the car is generally built of steel. This is especially true of all V shaped cars that dump over the sides, by tipping. Today the writer does not believe that whether a car is built of wood or steel, or a combination of the two, is any longer a governing factor in selecting cars.

## Indiana News And Comment

### Account of Bedford Stone Club Auxiliary Hearings

By Our Indianapolis Correspondent

Declaring the Bedford Stone Club Auxiliary to be a combination in restraint of trade, Judge Z. E. Dougan, of the Hendricks, Ind., circuit court, has entered an order forfeiting the charter of the auxiliary and directing that its affairs be closed. The International Cut Stone Contractors and Quarrymen's Association, another defendant, was barred from future operations in Indiana. Both organizations filed notice of appeal to the supreme court and this will act as a stay in the execution of the judgment of the court for a period of six months.

U. S. Lesh, attorney-general of Indiana, who conducted the prosecution of the case against the stone companies, sought to have the court enjoin the defendants from carrying on operations complained against pending the action of the supreme court, but Judge Dougan refused to enter such an order.

"I do not believe it to be necessary," said Judge Dougan in response to the request of the attorney-general. "These defendants impress the court as wishing to do the right thing in this matter and the court does not wish to hamper them in the conduct of their business pending a decision of the supreme court."

Seventeen other stone companies of Indianapolis were cleared of the charge of combining in restraint of trade by the decision of the court. Their connection with the case was through their membership in the Bedford Stone Club Auxiliary, which was charged with intimidating independent stone companies in so controlling its members that it could fix prices and control the production of Bedford stone.

The state of Indiana has won a victory over the alleged Bedford stone trust when Judge Z. E. Dougan in the Hendricks Circuit court sustained the state's anti-trust suit against fourteen defendant stone companies, according to word received by Attorney General U. S. Lesh.

The defendant companies have been

using the International Cut Stone Contractors and Quarrymen's Association of Indianapolis and the Bedford Stone Club Auxiliary, Inc., as means to cover violations of the state anti-trust law, according to the findings of the court.

The court ordered the international organization to leave the state, directed the club to go out of business, and found against the defendants.

Conclusions of law in the case are not to be handed down by the court until later after arguments have been heard, it was said.

"The court finds," said the special findings of fact of the judge, "that prior to the bringing of this action the defendants entered into a scheme, design, understanding, combination and conspiracy to limit, restrain, retard, impede and restrict bidding for the letting of contracts, for the furnishing of stone to be used in private and public buildings in this state and elsewhere, in the furtherance of which scheme, design, understanding, combination and conspiracy said defendants did in a material, wrongful and unlawful way suppress competition in the production and sale of building stone in said state; and they did limit, restrain, retard, impede and restrict bidding for the letting of contracts for private and public works requiring the use of stone in said state and elsewhere."

Defendant companies in the case are the Bedford Cut Stone Company, Imperial Stone Company, Consolidated Stone Company, Central Oolitic Stone Company, J. P. Falt Company, Furst-Kerber Cut Stone Company, J. Hoadley Stone Company, Interstate Cut Stone Company, Matthews Bros., Perry Stone Company, John A. Rowe Cut Stone Company, Shea & Donnelly Company, Henry Strubble Cut Stone Company and C. Ittenbach Company.

Following the decision of the Judge of the Hendricks Circuit court at Danville, Ind., to the effect that the Bedford Stone Club Auxiliary and the International Cut Stone Contractors and Quarry Men's Association are combinations in restraint of trade, Walter W. Drayer, secretary of the international organization, declared in a statement that indications pointed to removal of the companies from the state. The organizations were given six months under court order to close up their business. According to Mr. Drayer, the individual companies will

have much difficulty in operating under the court order's provisions and he predicts the removal of both finances and fabricating plants from the stone districts in the southern part of the state.

He said this action would not be a retaliatory measure against any one because of the ruling, but merely a measure of protection on the part of the companies, who would be forced out of business if they remained in Indiana.

In his statement he said:

"The bringing of this action was based upon a number of ridiculous allegations, namely: That the defendants maintained a monopoly in the limestone industry; that they conspired to fix prices; that they incited strikes for the purpose of limiting production; that they created a slush fund to reimburse members who had taken work from nonmembers at a loss (and mind you we were charged in the state's bill of complaint with fixing prices); that they divided territory and that they refrained from bidding on Indianapolis work against local firms.

"Not one of these slanderous allegations were proven, in fact, no evidence was introduced in the hearing in support of them. It seems apparent that but a cursory investigation was made prior to the bringing of this complaint, otherwise the state would have deterred prejudicing public opinion against one of Indiana's greatest industries by any such ridiculous allegations.

"The stone trade in the past has been the victim of a deplorable and pernicious practice of price cutting. In the evolution of the building industry whereby the general contractor, rather than the architect or owner became the agency through whom subcontractors had to obtain their work, a damnable system of misrepresentation and bargaining with an owner's property was set up by too many unscrupulous general contractors.

"General contractors of this class, after obtaining bids on various branches of the work to be sublet, and using such bids as a basis for making up their own general estimate on which they obtained the work, set out to shop these various branches of the work. They never thought of giving the stone work to the stone contractor whose legitimate competitive bid they used to obtain the work.



Rather did they set out to get subsequent bids, and in doing so they not only communicated the low competitive bid, but oftentimes misrepresented it, agreeing to give the work to the contractor who would cut 5 or 10 per cent off the fictitious figure they represented to be the lowest bid. This brought no saving to the owner. He paid for the stone work the figure obtained by the general contractor in the original competitive bidding. The general contractor pocketed what he was able to save by peddling and shopping the work as additional profits. The owner, due to the fact that the cut stone contractor who did take the work did so at a figure below cost, got a job in keeping with such figure. In other words the quantities were curtailed, while the grade of material and the workmanship were slighted.

"Due to this pernicious practice thousands upon thousands of dollars have been sunk in quarry property and equipment in Indiana that will remain there until judgment day, while the investors went broke.

"Now the stone trade, in order to stabilize the business, to eliminate these leeches from the building industry, and to give to the owner a faultless job in keeping with the architects plans and specifications at a minimum cost, set up a principle whereby it would bid in open and legitimate competition, the individual firms exercising their rights to decline to submit subsequent figures upon a job on which competitive figures had been previously taken and the general contract awarded. Surely a commendable principle; one that stabilized and placed the industry upon a straightforward business plane and one that assured the owner of a job in keeping with his architect's plans and specifications at a minimum cost. The method by which we sought to accomplish this principle the court has held to be in violation of a state anti-trust law.

"It would seem that what our government, Federal and state, requires today is a definition of trusts; what is and what is not a trust. Anti-trust legislation was set up a number of years ago to prevent gigantic combinations of capital from monopolizing business, and rightfully so. The courts now place a very wide construction upon these anti-trust laws, which, unless modified, is going to have a demoralizing effect upon American in-

dustry. To class as a trust a vast number of individual competitive interests that endeavor through an association to place industry upon a high ethical plane of responsibility and integrity for the benefit of the public and the industry is both ridiculous and destructive.

"If the state's attitude is to be upheld, and we understand it to be the attorney general's position that all associations of competing interests are inimical to the law of Indiana, then Indiana will indeed drive many of her prominent industries out of the state. As for the stone trade, nature has of course located the quarries in Indiana, but as the capital that has made this great industry possible has come from other states, that capital and the plants that make possible the industry that gives employment to thousands of people at maximum wages, will undoubtedly be forced to locate in other states."

H. P. Radley, age sixty-eight, president and general manager of the Bloomington and Bedford Stone Company and one of the widely known of the stone operators of the Bloomington-Bedford district, died July 2 of uremic poisoning following a short illness. Mr. Radley for years has been one of the leading stone operators of Bloomington and Bedford. He was connected with John R. Walsh in the days when Walsh was prominent in Chicago and southern Indiana. He was for a time general freight agent of the Walsh railroad. He was then sent to Bedford by Walsh and had charge of the Walsh stone interests. Following the Walsh failure, Mr. Radley continued in the stone business and ten years ago removed to Bloomington. He took a prominent part in local affairs, was a director of the Bloomington Chamber of Commerce and an active Democrat. The widow survives.

The Indiana Concrete Products Company, with a capital of \$10,000, has been incorporated to manufacture concrete products at Indianapolis. Chales E. Phillips, Joseph Erpelding, Lawrence Erpelding, Vincent Erpelding and Nora D. Erpelding are the directors of the company.

The Medusa Cement Manufacturing company represented by W. B. Newberry of Cleveland is considering the establishment of a large cement factory east of Logansport, Ind., if the proper quality is found during the

tests now being conducted. Tests have been made on several farms in the vicinity. Options for tests were taken on several hundred acres of land in the vicinity of the plant of the Logansport Stone and Construction Company, Lime Kiln, a few years ago. It is said that a certain grade of clay used in the manufacture of cement has also been found in Cass county.

The Meshberger Bros. Stone Company has incorporated at Linn Grove, Ind., with a capital of \$100,000, \$50,000 preferred stock, to operate stone quarries. The directors are Harry Meshberger, Oscar Meshberger and Jane Meshberger.

The interstate commerce commission's order in the cement rate case, which was instituted by the Cement Manufacturers' Association of Chicago, means that the intra state rates on cement in Indiana will be higher, but will not be discriminatory, according to H. A. Hollopeter, assistant traffic manager of the Indiana State Chamber of Commerce.

"The revision, in all probability," Mr. Hollopeter said, "will mean an equalization with the interstate rates, which are higher, and which would not be lowered to the level of the Indiana intrastate basis. Indiana consumers of cement, however, would not suffer, as similar intrastate rates on cement in Illinois would be raised accordingly to the new Indiana or interstate rate level."

Indiana's principal cement production centers are Limesdale, near Greencastle, Bluffington and Stroh.

The reopening of the Indiana Board and Filler Company case, Mr. Hollopeter said, meant merely the transfer of the case to the jurisdiction of the public service commission, from which it was taken as a result of the injunction obtained by the railroads from the federal court against the public service commission's order. The case was instituted by the State Chamber of Commerce.

The Bloomington Crushed Stone Company, Bloomington, Ind., has filed certificate of final dissolution.

The Morocco Sand and Gravel Company, Morocco, Ind., has been incorporated with a capital of \$25,000; \$10,000 preferred stock. They will mine sand and gravel. The directors of the company are M. E. Graves, J. R. Deardurff, Ross Lucas, J. B. Red-

den, Frank Billings and Fred G. Richmire.

The Kickapoo Sand and Gravel Co., located west of Peru, Ind., is rapidly approaching completion and will soon be ready for production. The side tracks have been laid, the concrete storage tanks have been completed and the large transformers set and filled with oil. When completed and in operation this plant will be one of the largest gravel pumping plants in the state.

E. B. Thornton, Bedford, Ind., stone operator, has bought a ten-acre tract of heavily wooded land inside the city limits, of the Kramer heirs, and after beautifying it by landscape gardening, will present it to the city for a children's playground.

A motion for a new trial was filed June 22 at Marion, Ind., by taxpayers in the case of John Weigel, contractor, who seeks to collect \$8,393.54 for gravel which he asserts he supplied to the county. Payment of the bill was held up by the auditor because of the protest made by John Pinkerman and other taxpayers. The commissioners allowed the bill, but an appeal was taken to the circuit court by the farmers. Trial of the case recently came to an abrupt ending when Judge J. Frank Chaires instructed the jury to return a verdict for Weigel. The motion for a new trial says that the court erred in not permitting certain evidence to be heard. Farmers resisted payment of the claim on the ground that Weigel's measurements were in excess of the amount of gravel the county actually received. The court ruled that the measurements of the state board of accounts engineer for the taxpayers was taken six months after those of the county surveyors and Weigel, and that gravel had been taken out of the same pit in the interval.

Vern Kirkendorfer, who several months ago purchased a 40-acre farm in Elkhart County, Ind., near the Kosciusko county line, did not know at the time that he would pay for it within a few months with gravel taken from a pit on the place that had long been unsalable. Lawrence W. Seaman of Goshen, has road contracts under way in Elkhart and Kosciusko counties aggregating \$250,000. Instead of shipping in gravel he has erected a washing plant on the Kirkendorfer farm and is hauling material in Ford trucks to three roads.



## The Production of Fines

The production, care and disposal of the fines from any quarry plant generally offer serious considerations for the operator. No matter what care is taken to reduce the percentage of fine materials, there are always varying amounts coming from the crushers.

"Fines" is a term that can cover many different sizes of small stone. The presence of these small sizes depend on the amount of rock that is being quarried, the way the rock lies in the ledge, and more particularly on the sizes of stone produced and the purposes for which this stone is to be used. For example, if a quarry is producing almost entirely a limestone for fluxing purposes, all material that is too small for flux stone can be classed as fines. This would mean that any stone which went through a 2½-inch ring would be so classified. In a quarry producing stone for road purposes only there would be nothing larger than 2½-inch or 3-inch stont, while the fines would all be ½-inch or smaller. It can thus be seen that in the flux stone quarry the fines would include all the stone grades that would be produced in an operation conducted for the purpose of securing stone for roads. This shows how difficult it is to use the common term fines and still distinguish between certain sizes.

These two illustrations likewise point out how necessary it is for a quarry producing crushed stone to be able to sell all the sizes. Thus, a quarry turning out stone for fluxing purposes should likewise sell concrete aggregate and stone for road purposes, so that all sizes produced will have a market. Of course, if this can be accomplished the subject leaves no material for discussion, and the problem answers itself. But in a large number of cases this is not possible, or rather it is not being done, and the subject of fines is a "live" one. The question may be viewed from two angles—one looking toward reducing production of fines, and the other toward selling those that are produced.

Softer stones, such as sandstones and most of the limestones, particularly when the ledges are laminated and the strata broken up through earth pressures and the action of water, result in the production of a higher percentage of fines than is found when hard granite, trap, gneiss, schist, and similar rock are crushed. Another factor that

governs the amount of fines is the smallness to which the stone must be crushed and the number of crushers through which it must be put. If stone from 1 to 3 inches is desired, and more than 50 per cent must be over 2 inches, there would not be as many fines produced of the same kinds of stone as if more than 50 per cent must be between 1 and 2 inch ring stone. Then again, if most of the stone produced must be from 1 inch and under there would be a larger percentage of fines than if 1½ and 3 inch stone were being produced.

Modern crushing plants have primary and secondary crushers, and many cases put the stone through a number of small finishing machines such as those of the disc type which take care of larger material from the secondary crushers. This passing of stone through three sets of crushers means more grinding, and consequently more fine material.

In some few cases quarries find sale for all their fines, having trouble only in the disposal of the coarser materials. In some cases these quarries have little trouble due to the fact that they can recrush the larger sizes of stone, thus turning out everything with fines. It is not meant in this article to consider such quarries, but only those that are producing an excess of fines.

In order to solve a problem of this kind it is first necessary to find out certain facts. The first of these facts concerns itself with the amount of dirt fed with the stone into the crusher. Should this dirt be present in considerable quantity it would naturally increase the volume of dust, and also render the dust unfit for sale if it were possible otherwise to sell this material. There are two methods of preventing dirt from entering the crusher. The first one naturally is to observe considerable care in the work of stripping, and make certain that the top of the rock has been cleaned and is free of all spoil. If this cannot be easily done by the ordinary methods, it might be advisable to wash the top of the ledge, if such a procedure can be carried out easily and cheaply. However, if all the dirt cannot be taken off the rock, or if there are pockets of dirt in the ledge, this objectionable material should, as far as possible, be picked up on the quarry floor and disposed of separately.

No matter how great the amount of care is taken, some dirt will be loaded with the stone and carried to the crush-

er. If this dirt occurs in considerable quantity its entrance into the crusher can be prevented by the use of a grill or grizzly, which will permit the stone to slide into the crusher and the dirt to fall through. In certain cases it might even be economical to install a grizzly feed which might eliminate a large percentage of the undesirable material. In such a case only that dirt which is actually adhering to the rock would be carried to the crusher. Under the grizzly could be built a hopper feeding a belt conveyor that would carry the dirt to one side, where it could be disposed of by some cheap method.

With the stone entering the crusher entirely free of dirt there would be less fines. If more than one crusher were used there should be an arrangement to take out all the finer stone from the product after it had passed through the crusher. This is especially so if the ledge is overlaid with a fair amount of soft disintegrated rock that will not be acceptable for the product sold unless it is included with the dust or very small size screenings. A large percentage of such rock will be pulverized by most primary crushers. This material and the very fine stone should be taken out of the product as soon as it passes through the crusher.

Here is where the screening should be done, and many plants now have what is called a scalping screen immediately below the primary crusher. If an operator has no trouble in selling his fines all he needs is this scalping screen, but if he is producing an excess of fine material it is obvious that he is making a mistake in passing through his crushers a second time stone that does not need recrushing. At this point he should take out all of the dust, and all stone that will grade smaller than his largest product, only passing on as tailings to the other crusher the stones that are too large to grade in with his product. This does not mean that an operator must have bins under such a screen, but there should, however, be small hoppers to catch the product and allow a chute or belt conveyor to carry them on to an elevator which will bring them through the grading screen. Thus, a screen that is directly below the primary crusher should have a ring that will allow everything from dust to the maximum sized product to pass through it. With a dust jacket the dust will be taken out and carried

away from the dust in the grizzly. The tailings of such a screen should go through the secondary crusher while the crushed product could be carried to the elevator. This same arrangement can be made after the stone passes through the secondary crusher if it is to be carried on to a third reduction machine. But, if only the tailings are to be allowed to enter the third crusher, as they should be, then a second screen is not necessary.

This arrangement would materially reduce the percentage of fines, which can be further reduced by paying careful attention to the setting of the crusher. If either the primary or the secondary crusher is turning out too much fine stuff, it would be better to open up the crusher and allow more stone to pass through unbroken, bringing this back to be recrushed. As this stone will be free of all fine stuff it is not likely to be crushed up so fine and the percentage of fines will be very materially reduced. These are some of the ways of effectively preventing too much fine material.

The next consideration is that of selling or otherwise disposing of fines that are produced. The disposal will depend somewhat on the kind of stone that is found in the quarry. Finely ground limestone of sufficiently high calcium content and free from large amounts of objectionable material can be used to reduce soil acidity, and should be in fairly good demand in every section. It is not possible, of course, to make a similar use of such materials as crushed granite. In determining the best way to sell or otherwise dispose of fines one must first investigate the purpose these materials would serve, with particular reference to their present condition, so that rehandling, recrushing or grinding may be avoided. It is natural in most cases to assume that the most money can be made out of materials on which no additional money has been spent. This will not, of course, be true in all cases. In some instances it would pay to have the stone analyzed and tested for a variety of purposes. Investigation should also be made as to the way in which the material must be packed and shipped.

To accomplish these things there should be a responsible individual or department around whom or which a selling organization can be established. If this is done there can be easily developed a business that will not only



prove profitable but may even exceed that of producing the regular product.

Today there are many uses for these fine stone products. Fines of all kinds, including those of limestone, can be used for finely finished concrete blocks, brick and ornamental work. Stone chips can be sold for finishing concrete sidewalks, and covering bituminous wagon roads. Sewer pipes and concrete tile can also be made of these products. A certain market is also afforded by the poultry trade if the stone be sufficiently limy in character. Roofers will also require some of the output. Some states allow the use of amount of fines in road-building for macadam, tar and asphalt roads. Some finely pulverized stone can also be used for making scouring soap and powders. There are a great many other uses, some of which depend, of course, upon peculiar characteristics of the stone.

To find where such things are used and to sell or make contracts with possible users are functions of a selling organization. If regular sales cannot be made and the business is seasonable, it will be necessary to store these products as inexpensively as possible so that the material will be available when sales are made.

To some operators these facts as presented may be of little value, but the writer has seen storage piles of fines in many quarries that represent large sums of money. Even in some small quarries these piles represent several thousand dollars of cost for reduction only. In some large quarries that he has visited these storage piles represent the accumulation of a number of years and the cost in money of producing fines has run over a hundred thousand dollars—enough money to make an individual independently rich. These facts show the importance not only of reducing the percentage of fines, but of disposing of them as they are produced.

Quantity production will be begun by the first unit of the Blue Bonnet Lime Company's New Plant at Fort Worth, Tex. Initial production of the plant will be 150 barrels a day and this will be doubled with the completion of the second unit. A dehydrating plant with a daily capacity of fifty tons has been erected on the company's lot. This is the first plant of this nature in the territory surrounding Fort Worth.

## Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,459,130. Rock-Crusher. William R. Young, Brooklyn, N. Y.

1,459,340. Crusher. David J. Nevill, Denver, Colo., assignor to Stearns-Roger Mfg. Co.

1,459,481. Excavating-machine. William E. Trappnell and Joseph A. Eastwood, Madisonville, Ky.

1,459,837. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,838. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,839. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,840. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,841. Vibrator for screening-machines, etc. Benjamin A. Mitchell, Garfield, Utah.

1,459,842. Screening-machine and screen-cloth therefor. Benjamin A. Mitchell, Garfield, Utah.

1,459,843. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,844. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,845. Screening-machine and screen-cloth therefor. Benjamin A. Mitchell, Garfield, Utah.

1,459,846. Vibrating screen. Benjamin A. Mitchell, Garfield, Utah.

1,459,847. Differential vibrator. Benjamin A. Mitchell, Garfield, Utah.

1,459,848. Percussion drill and the like. Benjamin A. Mitchell, Garfield, Utah.

1,460,008. Rock-pulverizer. Carl S. Willis, Bellingham, Wash.

1,460,073. Mining and quarrying machine. Cyrus S. Oldroyd, Cincinnati, Ohio, assignor to Oldroyd Mfg. Co., Knoxville, Tenn.

1,460,074. Motor-driven truck. Cyrus S. Oldroyd, Cincinnati, Ohio, assignor to Oldroyd Mfg. Co., Knoxville, Tenn.

1,460,075. Mining and quarrying machine. Cyrus S. Oldroyd, Cincinnati, Ohio, assignor to Oldroyd Mfg. Co., Knoxville, Tenn.

1,460,076. Mining and quarrying machine. Cyrus S. Oldroyd, Cincinnati, Ohio, assignor to Oldroyd Mfg. Co. Knoxville, Tenn.

## Improvement in Steam Shovels

The latest development by the Marion Steam Shovel Company is the introduction of crawler trucks to railroad type shovels, and is one of striking importance to pit and quarry operators. It has vast potentialities to the quarry operator—lower cost, fewer men, increased output, less equipment, etc.

Almost every quarry of any size has one or more of these shovels, loading rock or stripping overburden. The investment tied up in working tracks, rails, ties and jack blocks is enormous, when taken in the aggregate the country over. All of this equipment can be eliminated with the use of these new trucks. Besides, time is saved when moving ahead or when kicking back out of the way of blasts or slides. It is stated that the actual working hours can be increased from 10 to 15 per cent and the payroll for common labor around the shovel reduced by more than 50 per cent.

One of the features about these trucks is that they can be applied to Marion shovels now in use. Thus, even an old machine can be brought thoroughly up-to-date and made to produce on a par with new equipment. All standard Marion railroad-type models can be equipped with these trucks and the company is prepared to give estimates and performance facts to any one interested.

## Loose Leaf Hoist Catalog

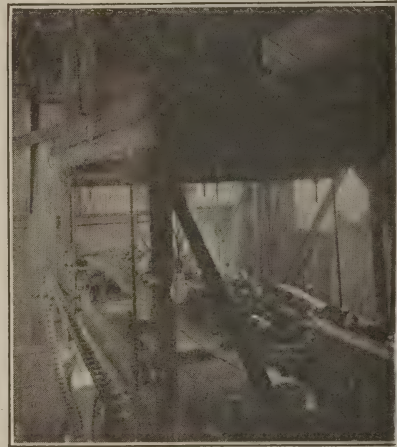
The tenth edition of the National Hoisting Engine Company's steam, electric, and gasoline hoisting engines, is prepared in loose-leaf form. In the book are described National steel and wood derricks; pile and sheeting hammers, and other of the company's products. The book is splendidly illustrated throughout. It shows in connection with the illustrations all information on the company's products, the information being given mostly in tabular form. At the beginning of the book are included a number of pages on construction details of the hoisting engines. The guy and stiff leg derricks described at the end of the book are illustrated with line drawings.

Copies of this tenth edition of the company's catalog may be secured by writing the National Hoisting Engine Company, Harrison, N. J.

## Conveyor Weighing In Industry

As the cement and quarry industry has more and more become infused with scientific methods, the matter of accurate weights has assumed a growing importance. But coincident with the need for accurate weighing has grown the demand for speed in moving these materials to and through the plant; and speed and accuracy are two factors so opposite in characteristics that they are difficult to reconcile.

With the development of conveyors—belt, bucket or pan—the question of speedy and laborless transport of bulk materials was solved—but until a few years ago, no matter how fast these materials could be transported, if an accurate check on their weight was



required, there had to be a pause in the steady flow somewhere along the line to permit weighing.

The question then arises, how can the weight of the material be determined without seriously interrupting operations?

A conveyor weightometer solves in a clever and decidedly interesting manner the problem of weighing material while carried on a moving belt, pan or bucket conveyor, making an accurate and reliable mechanical record of the weight of the material while passing in transit and doing so without interrupting the flow.

No weighman or other attendant is required and the weights do not have to be taken by hand. Consequently, all chances of error due to the human element are removed; and with the pass-



ing of the weighman goes the operating charge—his wages.

Where material is thus conveyed, it is desirable to know the amount handled, both in regard to rate of operation and total weight passed in a given time. Such records can not only be made at the scale, but by distant indicators in a central or control office, so that the progress of loading a vessel, for example, can be seen at once by reference to an autographic chart.

For example, the Michigan Lime-stone & Chemical Co., Rogers, Michigan, sell all their stone over conveyor weightometers. This plant ships between five and six million tons of stone yearly, the shipping season only lasting approximately eight to nine months; therefore, it can be readily seen what a difficult matter it would be to obtain the weight of such large quantities of stone if not handled by conveyors and weighed in transit. Here the stone comes from the crushers, delivered to a system of conveyors, which carry it to bins or outside storage; other conveyors are then used to move the stone to the boats or barges and on each loading conveyor a conveyor weightometer mechanically records the weight of the stone. The same type machine is used at the Tomkins Cove Stone Co., Tomkins Cove, N. Y.; Standard Lime & Stone Co., Havre de Grace, Md., and also at the Kelly Island Lime & Stone Co., Alpena, Michigan.

Cement mills keep record of material such as hot cement clinker as it comes from the kilns, also stone and shale from cars or storage and finished cement, by using the conveyor weightometer. These machines have also been adapted to proportioning cement mix.

The conveyor weightometer is made by Merrick Scale Mfg. Co., Passaic, N. J.

The Miscoast Rock Co., Santa Barbara, Cal., has been incorporated with a capitalization of \$100,000. The directors are T. G. Degman, A. W. Belmont and Frank J. Richards, all of Santa Barbara.

The Laurel Hill Sand and Gravel Corp., Queens, N. Y., has been incorporated with a capital of \$15,000. The Directors are: M. C. Becker, J. W. Newman and I. H. Kutz, 100 Broadway, Manhattan.

## Combustion Engineers

Mr. Jos. W. Hays is just completing the organization of a corps of consulting combustion engineers to be known as Jos. W. Hays and Associates. The headquarters of the organization will be Michigan City, Indiana.

Mr. Hays has been finding it impossible for some time past to meet all of the demands upon his time, and for this reason is forming the organization.

Jos. W. Hays and Associates will be prepared to render consulting service in steam plants in all parts of the country.

## Track Shifting Machine

The Lake Superior Loader Company presents to owners of industrial railway systems the Peterson patented track shifter, a simple machine built expressly for the purpose of shifting track on dumps, in open pits, on contractor's construction, on railroad construction, etc. The manufacturers claim for the device that with one man operating it the machine will replace over half the ordinary track crew with their bars and jacks and will cut the time down 75 per cent.

The track shifter moves under its own power and transports the entire crew to the job. The manufacturers claim that no track is too heavy, no ties too deeply imbedded or frozen in, no grade too steep, but what the track shifter will yank it loose. They claim that it will not kink the rail or bend the tie plates, and that its powerful action extends over such a length of track that the easy movement does not distort it in any way.

Full information may be obtained by writing the Lake Superior Loader Company, Providence Building, Duluth, Minnesota.

## White Motor Company House Organ

*The Albatross*, monthly publication of the White Company, Cleveland, Ohio, contains information on White trucks and news about White truck users that may be of interest to producers in our field. Much of the paper, of course, is devoted to equipment that would not fit in with pit and quarry uses, but certain of it is to the point for a pit and quarry operator.

## "Driver Dan" an Interesting Publication

*Driver Dan, the Sterling Man* is going strong. This breezy little publication, issued by the Sterling Motor Truck Company, besides being neatly and attractively printed, is well edited. The issue for Summer, 1923 talks of other things than autos and, talking well, is interesting.

Persons wishing to be put on the mailing list for "Driver Dan" should write the Sterling Motor Truck Company of Milwaukee, Wis.

## Cutting Labor Costs

Pressing mechanical means into the service formerly performed by hand is the one way of overcoming the existing labor shortage, which promises not only to continue but to become more acute. While a machine can perform the duties of from one to one hundred men, depending upon its kind and application, it does not reduce the wages of those men who remain as operators and assistants to that machine.

These thoughts are brought out by an account of how R. McAllister of Philadelphia has reduced the unsatisfactory hand labor in loading delivery trucks to the minimum.

Before installing the Link-Belt portable belt conveyor that is now operating it required four good men thirty minutes to load a truck. The portable belt conveyor now loads the same two-ton truck in five minutes, with one man, and that period allowing ample time for the backing and spotting of the truck. It is said that, once in place, the conveyor-loader can handle a ton a minute, with uniform feed.

At \$5.00 a day, the economy in labor costs would total a sizeable sum during the course of a month. This saving, coupled with the saving of 25 minutes per load in truck time, which earns money only while busy and which usually costs from \$16 to \$20 a day, soon justifies the \$585 investment and the small amount of electricity required to operate the two-horse-power motor.

The machine was designed and built by the Link-Belt Company of Newtown, Philadelphia, Pennsylvania.

## Waukesha Industrial Unit

A booklet on the Waukesha Motor Company's industrial unit, besides describing that unit in detail and giving specifications on the motor, housing, radiator, clutch, and other features, shows applications of the motor in various operations in many parts of the country.

The motor is shown in each case as the power plant of a well known piece of equipment. For example, the Waukesha motors are illustrated in connection with Ingersoll-Rand air compressors, Koehring grade mixers and pavers, Penn Bridge Company cranes, Pawling and Harnischfeger shovels, Chain Belt Company mixers, George Haiss loaders, Whitcomb locomotives, Gray tractors, and Mundy hoists.

There are also shown pictures of a number of operations in which the Waukesha motor is used as a power unit to drive a number of pieces of equipment in the plant itself.

Copies of the booklet may be received by addressing the Waukesha Motor Company, Waukesha, Wisconsin.

## Improved Steel Sheave Blocks

In its line of steel sheave blocks the Mining Machine Company of Mountville, Pa., claims a combination of several new features which greatly



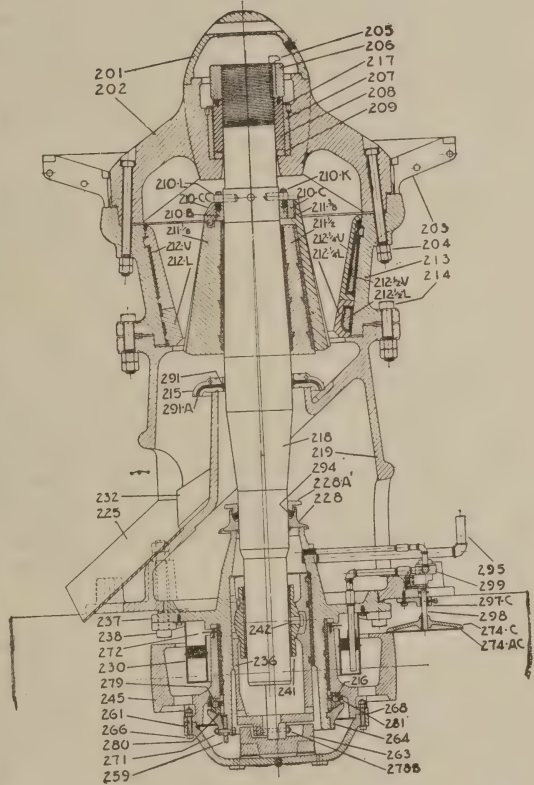
simplify the operation of rope haulage, and eliminate to a great extent many objections common to some of the present day types. Special attention has been given to providing liberally for all parts that are subjected



# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.



Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

**KENNEDY VAN SAUN MFG. & ENGR. CORP.**

50 Church St.

NEW YORK

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to excessive strain or wear. The large clearance at the top of the pulley allows splices and knots in the rope to pass through freely. In placing the rope in position no parts are unscrewed or undone. The spacing between the fingers through which the rope passes is in proportion to the size of the rope for which each block is designed. The hub on which the pulley revolves is of large proportions and should add materially to the life and strength of the block. A special type of bearing with proper means of lubrication is provided on three sizes made by the company. There is a pulley with 7 inch diameter for  $\frac{3}{8}$  inch rope, with 8 inch diameter for  $\frac{1}{2}$  inch rope, and with 9 inch diameter for  $\frac{5}{8}$  inch rope. Further information may be secured by writing the Mining Machine Company of Mountville, Pa.

### Portable Box Car Loader

In a four-page folder the Ottumwa Box Car Loader Company of Ottumwa, Iowa, describes its portable handy belt loader for loading into box cars such material as lime, cement, phosphate, sand and gravel, crushed stone, and silica. The manufacturers claim for this device that its quick raising and lowering features permit entering the smallest cars and loading the largest cars to capacity.

Among other features of the loader are the latest improved Alemite greasing system which does away with oiling.

The company offers to producers free service of its engineering department, which is ready to aid in solving loading problems. The engineering department is prepared to send complete information in any case without obligation. Further information can be secured by addressing the Ottumwa Box Car Loader Company, Ottumwa, Iowa.

### Describe Belt Conveyor Idler

The Mellin belt conveyor idler is described in Engineers Bulletin No. 4 of the Chillingworth Engineering Corporation of New York City. In the bulletin are included tabulated information, formulated for computing belt capacities in tons, horse power of

horizontal and inclined belts, and ply of belt. The formulated and tabulated matter are line drawings that illustrate the particular feature being considered.

Rates on cement shipments entirely within Illinois, and within Indiana, were declared on July 10 by the Interstate Commerce Commission to be unduly preferential to producers in those states and to constitute a discrimination against shippers in Hannibal, and St. Louis, Mo. Railroads were ordered to file new schedules by October 12 carrying rates no greater on interstate shipments than are charged on shipments within the state within equal distances. The new rates must be based on distance and be not in excess of 7 cents per hundred pounds for distance of 20 miles, ranging up to a maximum of 21½ cents for distances of 700 miles.

The Trinity Portland Cement Company of Dallas, Texas, announced on July 14 the purchase of 602 acres of land, north of Fort Worth, on which will be erected a cement plant of 2,500 barrels daily capacity. The present Dallas plant of the Trinity Company is producing 4,500 barrels daily. Offices will be opened at once at Fort Worth, to provide headquarters for the project. Officers of the company active in the deal are Mr. McCourtie, and Mr. C. D. E. Ulrickson, Vice-President, and General Manager.

The Danish Motorship Leise Maersk cleared from Hamburg with a full cargo of building material for Los Angeles. In the hold were 3,000 pounds of cement. This is expected to relieve the cement shortage that has held up building operations about the harbor district of Los Angeles.

Sales representatives of the McGrath Sand & Gravel Company attended a conference in Bloomington on July 14, to map out plans to meet the prospective shortage of cars when coal starts to move in volume, during the latter part of the building season.

The Cement Manufacturing community of Portland, Colorado, was reported on July 16 to be under 5 feet of water. All communication with the town was cut off, and the extent of the damage could not at that time be ascertained.



# Pit and Quarry

Member Audit Bureau of Circulations

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7

CHICAGO, ILL., SEPTEMBER, 1923

NO. 12

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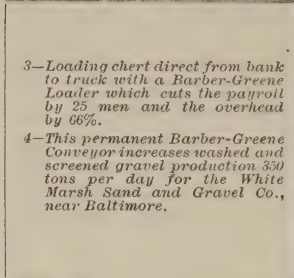
**JOHN J. FITZGERALD, Editor**  
**DANIEL J. HAUER, Associate Editor**  
**R. N. RISSE, Associate Editor**



1—The Oakland Construction Co. of California uses a Barber-Greene to make the most of the eight-hour day. Their record, made in January, is 105.5-yard trucks loaded in one eight-hour day.



2—This Barber-Greene is used because it reaches 30 feet farther than a crane in a beach sand plant near Cleveland.



3—Loading chert direct from bank to truck with a Barber-Greene Loader which cuts the payroll by 25 men and the overhead by 66%.

4—This permanent Barber-Greene Conveyor increases washed and screened gravel production 350 tons per day for the White Marsh Sand and Gravel Co., near Baltimore.



## Replacing Shovel Men and Locomotive Cranes

Neither the age-old shovel nor the formidable locomotive crane are always the best things to use for keeping down costs and getting production.

Each is very well in its place — but there are other types of equipment that often do the work more rapidly and more profitably.

Barber-Greene Portable Conveyors and Barber-Greene Bucket Loaders are intermediate equipment of this sort. In hundreds of cases they are an absolute necessity to profitable operation. In others they merely increase profits.

Are you overlooking them as primary equipment? Have you investigated them as supplementary equipment that will enable you to do more with your cranes, permanent conveyors, and shovel men?

If you haven't, ask us to have a Barber-Greene material handling engineer call.

Or send for our N catalog and performance records.

Barber-Greene Company, 490 W. Park Ave., Aurora, Illinois

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**BARBER GREENE**  
Portable Belt Conveyors  Self Feeding Bucket Loaders



# Pit and Quarry

Vol. 7

Chicago, Ill., September, 1923

No. 12

## Are You Protected Against Fire?

NEWS items in nearly every issue of PIT AND QUARRY tell of the destruction of stone crushing plants by fire and the struggle to rebuild them rapidly in order to be able to produce stone again during the season. No doubt the plants were insured, but the loss of income while rebuilding is not likely to have been insured!

Insurance of a plant is proper, but the modern business man should go farther than to insure his plant. He should protect it against fire. Fire is one of the greatest menaces that the business world faces today. Even when property is insured to its normal face value, many men and companies have been ruined by a fire. This is as true of stone producing and sand and gravel plants as those in other lines.

The question that should be put to every producer is, "Are you amply protected against fire?"

The reply to this is another question, "If I am not protected, what should be done?"

The answer can be given. In a few cases quarries and pits obtain their water supplies by gravity from an elevation higher than the top of the buildings. If this is the case a tank or reservoir can be built to give a ready supply of water and from this supply a sprinkler system can be fed.

Generally speaking the best protection known today against fire is a sprinkler system. Before a fire can

make enough headway the sprinklers begin to work at the point of origin of the fire and a deluge of water plays upon the embryo fire and it is quenched.

In few cases, though, can a gravity supply of water be obtained. Then, in order to feed the sprinkler system there must be pumps or a pump to feed the pipe lines.

The pumps can keep an elevated tank filled and thus supply the pipe lines. Or, if a tank is not used, the pumps feed the lines direct. It is then necessary to keep the fires under the boilers at all times and to have someone on duty to attend to them. This seems expensive, yet insurance rates are cut upon plants that have modern sprinkler systems in them. Then, too, all plants should have watchmen on duty day and night when work is not being done and the watchman can attend to the boilers and pumps. If electricity is being used the same man can turn on the current that operates the pumps.

Where pits must be unwatered the same pumps can be used as fire pumps. There are on the market today a large number of high pressure, large capacity pumps meant especially for fire protection.

In addition to a sprinkler system, fire hydants can be run through a plant and hose and nozzle kept attached to them for fire emergencies. These though are only of service when men are present. Action, though, can

be obtained more quickly than with a sprinkler system.

Water barrels and buckets can also be placed at convenient points around a plant to be used in an emergency. Regular inspections must be made to see that these receptacles are in place and kept filled with water.

Hand grenades filled with chemicals and fire extinguishers can also be kept, for many large fires can be prevented by their prompt use.

The men employed can be organized in a fire brigade and drilled in order to fight a fire promptly. All of these things are of value when fires occur and the men are at hand, but sprinklers do their work day or night whenever a fire occurs.

Another protection against fires is to prevent them by keeping hazards away from the plant. Oils must be properly stored. Stacks must be protected to prevent sparks flying. Oily waste must be burnt at once or put in tin receptacles. Trash must be kept cleaned up. Oil spilt must be cleaned up, and all other fire hazards must be looked after.

Another prevention is to build with materials that are fire resisting. Steel and concrete can take the place of wood and corrugated iron used for sides of buildings. Even floor and bins can be built of concrete. Thus the chance of fire is reduced and if one occurs little damage can be done.

Are you protected against fire in this way as well as by insurance? If not, why not?

## Austrian Companies Ask Lower Duty on Magnesite

On the petition of four Austrian companies the tariff commission ordered an investigation under the flexible provisions of the tariff law into the duties on magnesite. This is one of the raw materials imported by American steel manufacturers.

Nelson Lime and Cement Company, building material, has incorporated for \$15,000; W. S. Nelson, Jr., W. B. Patterson, G. A. Lambert, Memphis, Tenn. (Corporation Trust Co. of America.)

## In Which We Brag

Sometimes, when we run across an article such as that written by Burt P. Garnett in a recent issue of *The Dearborn Independent*, we get an opportunity to see ourselves with other people's eyes, to take inventory, and to find that our importance is greater than we may have thought it to be.

Mr. Garnett, in the article in question, tells us about "Un-American King Coal—Fifty Years Behind." To illustrate the way that the coal operators, chiefly those producing bituminous grades, are lagging behind the march of progress, Mr. Garnett refers to the strides that have been taken in the last few years by the sand and gravel industry. In his own words, ". . . the sand and gravel industry in America is on a par with other modern American industries. The coal industry is fifty years behind the times. Fundamentally, the two industries are alike. In both cases, a material is dug out of the ground, loaded into vehicles and hauled to the points of consumption. In so far as price is concerned, coal has a much greater value than sand and gravel. Why is it then, that you observe in most American cities, coal hauled in slow-moving, horse-drawn vehicles whereas sand and gravel are hauled in big, efficient motor trucks costing from three to five or six times as much as horses and wagons? Why should the methods of 1923 apply to the movement of cheaper material while the methods of 1873 survives in the handling of coal?"

Mr. Garnett might have gone a little farther and adduced comparisons from a number of the other industries in the pit and quarry field. There is no doubt that all these industries have been progressing considerably for quite a number of years. There are still many survivals of an older order of things, but in general the attitude of the average producer is one that



looks forward; he is doing his best to keep his own particular enterprise in step with the rest of his industry and with the other industries of the country. The results of this progressive spirit are becoming more and more apparent. The industries are coming more into their own in the way of public recognition of their value. Only a few years ago the writer, speaking to the mayor of a Southern city, seemed to occasion a little surprise on the part of this man when he referred to sand and gravel associations. "What," said he, "are those people organized, too?" Perhaps some of the activities of sand and gravel producers, as individuals and as associations, have in the last few years give this man a better appreciation of the importance of this industry.

Producers of stone, sand, gravel, gypsum and other materials in the pit and quarry field; are coming to be regarded more as manufacturers than "diggers". The production of Portland cement, has of course, taken its place among the important manufacturing activities of the country. The other industries are moving in the same direction.

### Builders' Supply Association Urge Use of Bags for Cement

At the meeting of the directors of the Southeastern Builders' Supply Association at Chattanooga, after careful consideration, a resolution was unanimously passed recommending to cement manufacturers that they change their basis of sale from barrels to bags. In doing this, they suggest that the manufacturers so adjust their selling cost as to permit terms of 5 cents per bag discount for cash in 10 days or 30 days net.

Bronx River Sand & Gravel Corporation, dealers in building materials, have incorporated for \$125,000. Members of corporation are W. B. Waldo, A. J. and A. J. Stone, Jr., 32 Liberty Street, New York City.

### Our Sincere Sympathy

PIT AND QUARRY wishes to express to Mr. A. P. Sandles, secretary of the National Crushed Stone Association, its sentiment of condolence at the death, on July 26, of his daughter, Kathrine Sandles. Kathrine, age 15 years, was called suddenly from the family circle. She was injured in an automobile accident and died at her home two hours later.

In conveying to Mr. Sandles and his family the expression of its sympathy, PIT AND QUARRY speaks as well for the many friends that Mr. Sandles has among our readers.

### 1923 Chemical Exposition

Plans for the 1923 Chemical Exposition which will open at the Grand Central palace, New York, on September 17th, and extend for one week, opening daily at noon and closing at 10 P. M., are about completed. Outside of the four hundred odd exhibits which are expected by the time the exhibition opens, two other features have been planned for this year. They are a moving picture program of industrial films to be shown each afternoon and evening in a special auditorium and for the purpose, and an intensive course in the practical business side of chemical engineering for students in various universities all over the country. Upwards of 200 students have already enrolled for the course at the Exposition. About thirty authorities in various fields of chemical engineering will discuss their specialties for the benefit of the students. Prof. W. T. Read of Yale University, is in general charge of the student course feature of the Exposition this year. The plans for 1923 do not include any list of general speakers as in previous years. The Exposition will be opened officially on Monday, September 17, at 2 P. M., by Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association, and chairman of the Advisory Committee for the Exposition.

Incorporated: Rock Cement Brick Corp., Buffalo, \$50,000. H. S. Wasson, W. Schumer. (Attorney, J. E. Barry, Buffalo.)

## Hermitage Portland Cement Mill Going Up Rapidly

Late information on the new mill of the Hermitage Portland Cement Company at North Nashville, Tenn., indicates that the project is moving along quite satisfactorily. On the morning of July 4, the first blast set off in the company's quarry served the purpose of helping celebrate Independence Day and also the other purpose of shoting down sufficient raw material for three months' operation.

It is claimed that by the first week of September the company will begin operation with a daily capacity of 2,000 barrels. Considering that the ground for the project was broken no earlier than March 20, this will be "going some." Credit for the work that has been done was given largely to Mr. R. T. Miller, general manager of the concern and formerly of the Pittsburgh Testing Laboratory.

The new mill will employ the wet process. Electric power will be used throughout and firing of the kilns will be done with coal.

Sand and gravel producers will recognize familiar names among the officers of the new company. John C. Vance of Chattanooga is president. T. R. Herbert of Nashville and his brother, R. D. Herbert, both interested in one of the largest sand and gravel operations in the south, are vice-president and secretary-treasurer respectively.

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Incorporated: Standard Rock and Gravel Company, Inc., Los Angeles. Capital stock, \$500,000.

---

The William Ellis Cement Products Company, Abrams, Pa., have commenced the manufacture of cement blocks at its new plant on Henderson road, Upper Merion township. The output will be 2,500 blocks of all kinds daily. The plant is operated electrically under the management of William Ellis of Upper Merion.

## Rock Demand in Southern California

There never has been known in the history of Southern California such a marked demand for sand, crushed rock and gravel as at present. In order to make a larger supply of rock available the city of Los Angeles proposes to change its specifications. The enormous quantities of these supplies which are used in building activities and highway construction and repair are transported almost exclusively by motor truck. All city delivery is made by this type of transportation and in many instances supplies are brought from points 20 miles or more from the business district.

Los Angeles county is not alone in its activities of this kind. In the neighboring county of Orange, compared to population, there practically is as much business in these materials as there is here. The Orange County Rock and Gravel Company, in this part of the state, is located there. To meet its delivery requirements it operates several "Bulldog" Mack trucks and hires a number of others privately owned.

Santiago rock supplied by this company, which is named from Santiago canyon, is said to be the hardest rock obtainable in this part of the state for road building purposes. The company's equipment is among the most extensive and modern in the state.

## Portland Cement in July

Production of Portland cement in July, as reported by the United States Geological Survey, amounted to 2,620,000 barrels, as against 11,557,000 barrels in July of last year. Shipments in July totalled 13,712,000 barrels as against 13,850,000 barrels in the same month of 1922. Stocks at the end of July amounted to 8,076,000 barrels, as compared with 8,433,000 barrels at the same period last year.

Imports of hydraulic cement in June, as reported by the Department of Commerce, amounted to 11,559 barrels valued at \$180,146, as compared with a total for the twelve months of 1922 of 323,823 barrels, valued at \$628,846.

Exports of hydraulic cement in June were 77,203 barrels, as against 96,263 barrels in June of last year.



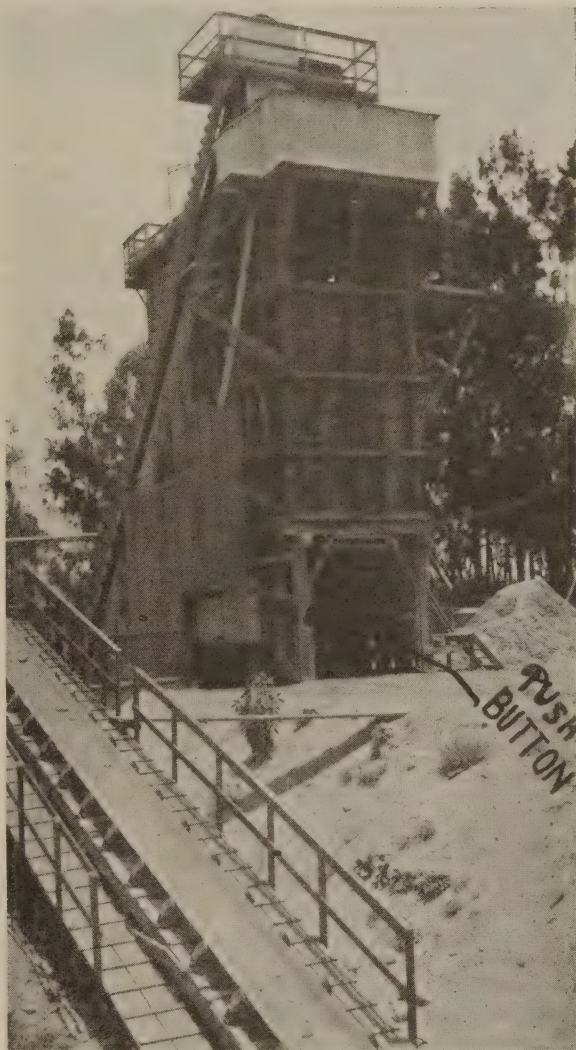
# This Plant Fears No Labor Shortage

ONE would hardly be expected to associate oranges and walnuts readily with a sand and gravel plant, yet there is at least one place where there is such an association. This is in southern California where anything unusual is likely to happen.

The principal point in the association of these diverse products is in the matter of labor. The chief activity of the section is the fruit growing which furnishes work through certain seasons of the year for all the labor that is available. These seasons are comparatively short but the necessity for helpers in busy times is great and the wages paid are such as to attract the workers from other industries. In planning for the plant that will be described in this article, this factor had to be taken into consideration and the operation designed in such a way that it would be possible to compensate for production irregularity.

Anyone who is at all familiar with southern California knows of a piece of territory in Ventura county from six to eight miles square that is probably one of the richest bits of farm land in America. Not many of these people, however, know of the fine deposit of sand and gravel that occurs there.

The deposit was originally formed by flood waters of the Santa Clara River which has a water-shed of 100 miles back in the mountains. The flood waters have been roaring and pounding down through the mountains for centuries carrying rocks and



View of Plant, Showing Also Location of One of the Safety Buttons.

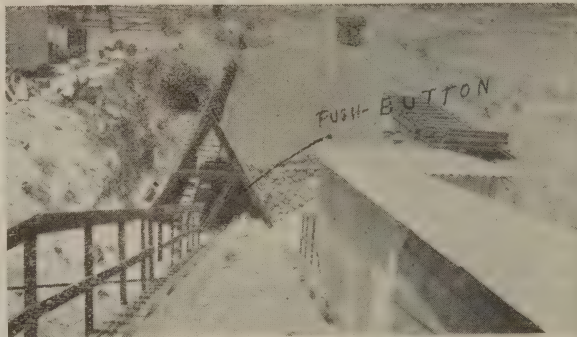
boulders through Nature's crushing process. When the river has reached the point at which the deposit in question occurs, only the harder portions of the rock materials have survived and these are laid down in quantities and qualities that make the deposit a very desirable source of commercial materials. The flat broad valley causes

a slowing up of the stream and the process which originally laid down sands and gravel in great quantity is still going on, although to a comparatively small degree.

Thus was formed a deposit that is practically the only source of supply for this grade of material within a radius of 50 miles. The principal cities of the county are all reached within easy trucking distance on level, paved roads, in fact, the entire system of paved roads in the county radiates from the very door of the plant.

The operation, located at Saticoy, is known as the Saticoy Rock Company. It became a worth-while factor in the production of the section when the present owners about a year ago acquired the deposit which had on it a small portable plant that had been operated in the crudest fashion and was in a very badly run down condition. Within four months, improvements and changes in method resulted in a fivefold increase in output and the building up of a steady trade.

By the first of the present year, it had become evident that a larger plant, one capable of turning out a first class product, would be necessary to reach the growing demand. Quite a number of things had to be taken into consideration in the building and, as a result of conferences, a very satisfactory plan was evolved. The first con-



Another of the Buttons is Located Near the Foot of the Main Conveyor.

sideration was of the capacity that the new plant should be designed to give. The amount of material that the county would absorb was an unknown quantity and, while it was desired to produce and sell as much as possible, it was necessary to avoid falling into the worse fault of building for a capacity that could not be realized because of small demand. Then there was the labor question that has already been referred to. At the times of the year when there is fruit picking and other similar work to be done, the wages that are offered by the growers are three and four times as great as the wages that are ordinarily paid, and laborers from all the plants around naturally flock to the work that produces this large revenue. It was thus necessary to figure on a plant that could be made to produce large quantities of material for storage to tide over the times when shortage of labor curtailed production. Associated with this consideration was another; the projected plant would have to be flexible, so that it would be possible with it to produce at low cost under either light or heavy production. The conditions that were thus imposed on the management were met and provided for with the result of a plant unique in a number of ways. The question of capacity was met by making an initial installation with an out-



put of about 75 yards an hour and so arranged that increases of capacity could be effected by the addition of units without throwing the plant already installed out of balance. At the time this article was written, the plant had been in operation but 30 days and it is already apparent that the capacity will have to be increased again next fall.

Up until the present time the entire consumption of material has been close to home where a market that was practically negligible before, has been built up. The experience of the management vividly illustrates how a community can be taught to use an article that it had never before felt or imagined that it needed. A good article at a moderate price, together with good service and suggestions, can go a long way toward building up a business.

Material is excavated by a No. 210 Pawling and Harnischfeger tractor dragline excavator. This machine has been rented and will be used until it is possible to get delivery on a new one or until further operations have indicated more definitely what the extent of the work will be; at which time it may be necessary to have a special excavator built. Materials after being taken out by the machine, are loaded in Kilbourn and Jacobs 5 yard side-dump cars hauled by a 4-ton Milwaukee locomotive. Cars are dumped at a 1,000 yard storage pile from where the material is drawn off as shown in one of the photographs to a 36 inch Stephens-Adamson belt conveyor, 125 feet between centers. This conveyor, which is arranged to travel very slowly, carries a heavy load and keeps a uniform flow of material running at all times in the direction of the crusher. The crushing is done by a 12x18 inch Universal and an 8x8 inch Universal. The product of the crushers is taken up by a 20 inch Stephens-Adamson elevator, 70 feet be-

tween centers, and carried to a 42 inch by 16 foot trommel screen. Gravel sizes go from this screen direct to bins and the sand is carried to a 14 inch by 12 foot log washer. The screen and washer are also products of the Stephens-Adamson Company of Aurora, Ill.

An interesting feature of the plant is that all units are completely under control of a series of push buttons, so



Push Button in Screening Plant.

that it is possible for two men to handle the operation of machinery from the storage pile clear through the crushing, screening, and washing operations to the loading and dumping of material on trucks. There is a push button at the bottom of the conveyor trestle running up into the plant, and from this point on a series of such buttons go through to a button at the loading point. It is possible to stop any part of the operations from several places. Their installation thus

has safety features as well as operating advantages. Too, it makes the installation cost of electrical equipment a little heavier, but this cost is soon offset by the reduced payroll, the more complete plant control that is made possible and the feeling of independence that comes with freedom from the whims of the laborers.

Only one elevator is used in the process, but the 70 foot rise that this gives the material is sufficient to carry it through the plant, step by step, by gravity.

All chains and gears are boxed in, so that they run in grease at all times. This eliminates the waste of oil and grease, reduces friction and results in an absolutely clean plant.

The management claims that the washing and screening is operated so nearly automatically, that there are hours every day when nobody goes near it. This is undoubtedly because the plant is the result of the twenty years' experience of its manager who has succeeded in uniting simplicity, economy and efficiency to a marked degree.

## Open Pacific Coast Office

Los Angeles has been made the Pacific Coast headquarters of the Raymond Concrete Pile Company, one of the largest construction corporations of its kind in the United States.

The company, which has twenty-one branch offices in the east, literally has put the foundations under a number of the biggest business enterprises in the nation.

Offices of the construction unit have been opened in the Washington Building and O. C. Struthers, one of the owners, becomes Pacific Coast manager. Branches will be established in the near future in other cities of California, Oregon and Washington.

Morocco Sand and Gravel Company, Morocco, Ind., incorporated. Capital, \$25,000, \$10,000 preferred; to mine sand and gravel; directors, M. E. Graves, J. R. Deardruff, Ross Lucas, J. B. Redden, Frank Billings, Fred G. Richmire.

## A \$3,728 Taxicab Bill

### One Truck Owner Got it When His Driver Borrowed The Truck

Just how Potter Bros. came to have a \$3,728 cab bill for one of their truck drivers, when the Colored Cab Co., of any color in the spectroscope would have done the job for \$1.35, is why Charlie Potter carried for quite some time a highly colored contusion on the rear of the calf of his left leg, produced by violent and repeated contact with the well shod toe of his right foot, vigorously applied. Charlie had kicked himself—hard.

Potter Bros. used a number of light delivery trucks, and among their drivers was Jimmy Kraft. Jimmy had a mother-in-law who had to go to visit another daughter, an enterprise in which Jimmy, as would any dutiful son-in-law, co-operated with enthusiasm. When everything was set for the momentous journey, it occurred to Jimmy that the proper style to send the old lady off in, would be the truck to the depot.

Jimmy always drove the truck home to his dinner, which all good truck drivers have in the middle of the day, when it will do the most good, and the train left at 12:45, so Jimmy asked the boss if he could take the m-i-l to the train with the truck. Well, Charlie was a human being plus, and Jimmy was an old and valued employee anyway, so of course Charlie said yes.

Nearly every good woman who starts out on a trip that she has been three weeks getting ready for, before she gets to the depot, thinks of at least one thing she has forgotten. Mrs. Kickbusch had arranged with her good friend and neighbor Mrs. Kreutzer to feed the canary while she was away, and then, good land! she had gone right off and clean forgot to leave her the key. So Jimmy had to go back and leave the key.

Now if Jimmy had been going to and from his house from the store, he would have come south on Market Street, and turned west into Towner Avenue. Elm Street comes into Market just a little south of Towner, making what is substantially a four corners with a jog in it. Jimmy had delivered the key, and just as he came out of Elm and was turning north on Market Street to go into Towner Avenue, where he would have been back



on his regular beat, and probably being in a little hurry on account of the extra trip with the key, he went plump into Grable's truck, and there we are.

The insurance company said they were not insuring Jimmy, and that he was not a driver for Potter Brothers while he was taking a key to Mrs. Kreutzer for Mrs. Kickbusch. That in any case, he was not back in the employ of Potter Brothers until he had turned the corner of Towner Avenue, where he would be on the route he always used in going to and from dinner. Gable didn't care what route it was on, it was Potter's truck and Jimmy worked for Potters, and it was nothing to him what the Potters let Jimmy do with the truck. Of course the Potters knew that giving permission to someone to drive their car did not make them liable for the negligence of the borrower. But then, there was the element of employment. So Charlie Potter called up Henry Stratton, an expert on automobile law. For a hundred dollar fee he advised Charlie that he didn't know.

"You see," said Stratton, sagely, "Jimmy is your employee, and it's your truck and you let him take it during the business day to do an errand from which he was to come back to his work. It may be the fact that letting him have the truck enabled him to get back to his work enough sooner so that it could be said it was actually of service to you to have him take it. Anyway, in a case like this you can't say as a matter of law whether he was in the course of his employment or not when the smash came. There are a lot of things that enter into determining whether he was or not. The law is plain enough—if he was in the course of his employment you are stuck—if he wasn't you aren't. But that doesn't get us anywhere. The real question is *was* he in the course of his employment, and that is a question of fact for the jury to determine from the evidence; not from what we *say* about it, but from what they find the facts are. And if the court takes that view of it, and lets it go to the jury, it takes more than human guessing to dope out what a jury may do."

Well, anyway, Judge Gibson took the safe side and submitted it to the jury, and they brought in a verdict for \$3,728. Judge Gibson thought that was a little stiff, and said he would cut it down to \$2,500 or grant a new trial. Potter

didn't accept the reduction, and Grable wasn't satisfied with it and appealed the case. The supreme court sustained the verdict as modified, and ordered a new trial as Charlie hadn't accepted the reduction. So it all has to go through the mill again.

"It's a pretty safe proposition" said Stratton after it was over, "not to lend your truck at all. But if you feel you have, to either separate the transaction so thoroughly from your business that nobody can say it was connected with it, and always bear in mind that it's not what you say, but what the jury determines, that settles that. It is safer not to lend your truck."

"How can I separate such a loan from my business?" asked Charlie, as he shot a glance at the checkbook, it began to look as if he was keeping on hand to be a goodfellow with, "Nobody knows" said Stratton. "It all depends on the jury. If they say so it's so."

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## Michigan Probes Cement Prices

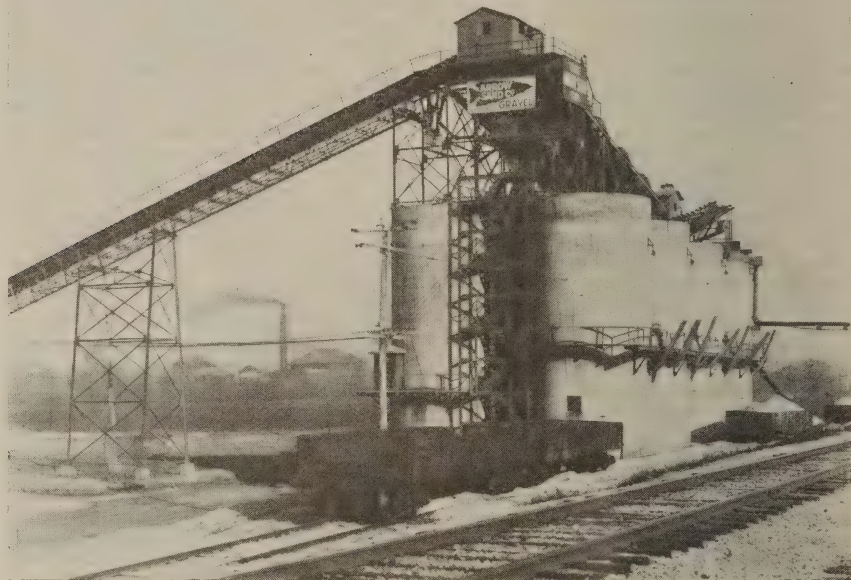
An investigation to determine whether Michigan cement producers have entered into a combine to manipulate prices was ordered on August 14 by the State administrative board.

The board's action followed a report from the State Highway Department that it had been unable to purchase cement for highway work except at what it regarded as exorbitant prices.

Gov. Alex J. Groesbeck suggested that the State build and operate its own cement producing plants and the board authorized the highway department to inquire into the probable cost of constructing one or two cement plants to produce from 700,000 to 1,000,000 barrels a year.

Incorporated: American Cement Securities Corporation; for manufacture of Cement, Lime, etc.; \$3,000,000; T. L. Croteau, Wilmington, Del.

The Palmetto Quarries Company of Columbia, S. C., has been granted charter for the operation of quarries. The company is capitalized at \$100,000 with George D. Lott, secretary and treasurer and Thomas W. Walters, president.



View of the Washing and Screening House and of the Reinforced Concrete Storage Bins. Looks like a Substantial, Permanent Structure.

## Duplicate Units Prevent Shutdowns at This Plant

Columbus, Ohio, boasts of a gravel plant that for careful design and efficiency of operation can well compare with many that are much more elaborately laid out. This plant, owned and operated by the Arrow Sand Company, produces daily 1,000 tons of high grade material and does it with only 7 men, one of these the superintendent. The operation of the plant calls for the service of a man at the hoist and one in the pit at the hopper, a man at the crusher house and another at the top of the washing plant. Two others are employed loading trucks and cars.

This low labor cost made possible by the care that was exercised in design is probably the most interesting feature of the plant but it is not

the only interesting feature. The large storage capacity is another and the general construction, too, affords opportunity for study.

The deposit is located a short way out of Columbus on a bend of the Scioto River, to the north of the Big Four Railroad. The area in which the material lies is about 82 acres in extent. Overlying the saleable materials is an overburden of 18 inches. The desirable materials run to a depth of 40 feet and are made up of sand and gravel in the proportions of about 45 and 55 per cent. These proportions will make many producers of sand and gravel envious. Men who are operating in other parts of the country and who think themselves fortunate if the amount of sand in a digging does not



go over 70 per cent will wish that they could move their plants to the deposit of Columbus where there are no mountains of waste sand storage.

Running through the deposit is a large amount of rock that requires crushing and makes possible the sale of the crushed product that is kept separated throughout the process from the regular run of uncrushed gravel sizes.

The sand and gravel are excavated by a Sauerman dragline cableway which has a capacity of 2 cubic yards. The hoist that operates this cableway is said to be the largest in use for sand and gravel work. It is a product of the Thomas Elevator Company and is powered by a 200-horsepower motor.

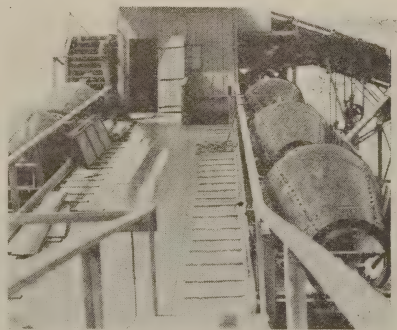
When the loads of sand and gravel are brought up by the bucket at the end of the dragline, they are dumped on an initial storage pile at the bottom of which is a hopper and a reciprocating feeder that forwards a steady supply of material to the primary belt conveyor. The function of this conveyor is to carry the material to the top of the belts from where it descends by gravity through various parts of the process. This primary conveyor operates between 240 foot centers at an inclination of 14 degrees and at a speed of 200 feet per minute. It was made by the Jeffrey Manufacturing Company who also furnished all the other conveyor and elevating equipment and the sand dewatering tanks. On it runs a Goodyear belt 30 inches wide.

The belt discharges directly into a scalping screen at the top of the crusher house. This screen removes all material 2 inches and under and chutes it directly to a secondary belt conveyor. Everything over 2 inches is passed to a No. 7½ Superior gyratory crusher. This product is passed through a tailing screen. Oversize from the tailing screen is sent through

a No. 5 crusher. The flow of material from the No. 5 crusher meets the flow from the No. 7½ and both are carried by the secondary belt conveyor to a set of Dull four-unit conical washing screens which produce 5 sizes, each going directly to bins.

The belt trestle running from the crushing house to the washing and screening plant carries two conveyor belts, one for the crushed and the other for the round material. The operation is accomplished as described by the scalper that takes the product of the primary belt conveyor. These two secondary conveyors are shown in one of the illustrations which also includes a distant view of the Dull screens and indicates the manner in which the belts discharge above these screens. Each of the secondary conveyors is 20 inches wide and operates between 295 foot centers at an angle of 18 degrees and at a speed of 300 feet per minute. They are spaced 3 feet apart. The point of discharge of the belts is 95 feet above grade.

It will be observed that much of the equipment throughout the plant has been installed in duplicate. This appears to be a very wise provision, for a failure in one particular piece of equipment will not necessitate the shutting down of the plant. The design makes possible the bypassing of any broken parts and insures a pro-



Two Sets of Dull Four-Unit Washing Screens Handle Crushed and Round Materials.

duction of some sort, however curtailed.

Each of the secondary conveyors discharges into a set of Dull washing screens to which water is supplied by 2 Weinman pumps which may be used together or singly, another precaution that makes for unhindered operation. The sets of washing screens are arranged parallel to one another, each set producing simultaneously 5 sizes; 2 inches, 1¼ inch, ¾-inch, ⅜-inch, and sand. Ordinarily the operation calls for the use of one set of screens for crushed gravel and one set for round gravel, but the two grades of material may be combined on one or both sets of screens.

From the Dull screens the gravel sizes are chuted directly to bins and the sand is flushed through flumes to a double-unit sand washing and dewatering tank. Arrangement in duplicate also shows up to advantage at this point, for units may be arranged so that one will produce concrete sand and the other masons' sand, or they can be so regulated that both units will produce the same kind of sand simultaneously.

After the product of the sand tanks has been passed on to bins, the overflow is sent to a low spoil area to the south of the Big Four tracks. Eventually the low ground to which this overflow is being sent will be filled

up by the fine materials that will settle out as the water becomes still. By the time this spoil area has been filled, there will be plenty of excavated territory into which it may be put; For, by that time, the company will have carried its excavating work far ahead.

Washed and graded sand and gravel discharge in 11 storage bins of 10,000 tons total capacity. Eight of these bins are circular concrete silos and three are formed by short connecting walls between points of the circular bins. The whole is a monolithic concrete structure erected with slip forms by Clemens and Martins of South Solon, Ohio. The circular silos are 54 feet high and have inside diameters of 20 feet. The concrete walls which are provided with circular reinforcements are 7 inches thick. The short connecting walls which form sides of the 3 intermediate bins are also of reinforced concrete construction.

A three way spout arrangement is made possible by the construction of the intermediate bins. This is well illustrated in one of the pictures which shows how a truck or car can be loaded by 3 spouts at the same time, one of these spouts coming from an intermediate bin and one from each of the adjacent circular bins. When the flow of material from each bin is properly regulated, any three-size mixture in any desired proportion can be obtained.

Various sizes, too, will be well distributed throughout the total mass.

Material below the level of the loading spouts may be reclaimed by a tunnel belt conveyor which runs to the east end of the bins and to the top of a steel tower where the material will be raised for



The Secondary Conveyor, Showing Trestle That Carries the Belts for Crushed and Round Materials.



loading or from where it can be dumped in the open storage. This open storage, which will be in line with the bins and will extend 300 feet to the east, has a capacity of 20,000 tons. It lies over a tunnel belt conveyor arranged to take off sand and gravel from hoppers at various points and carry the material back to a point where it can be loaded or returned again to storage in the concrete bins.

To the south of the plant is the initial storage pile which makes for flexibility of operation, as the finished storage makes for steady filling of orders. A pile containing about 2,000 tons is maintained at all times. This is enough to provide for 2 full days' run of the plant without excavation. Breakdown in the excavating equipment that can be remedied within two days, cannot stop the production of finished sand and gravel. If two days were lost through equipment breakdown and the initial storage pile were depleted, one night's operation would replenish the pile sufficiently to permit operation of the plant for two more days.

Another feature of the construction around the hopper is the provision whereby, through moving the 100 foot steel mast to various points around the hopper, it is possible to excavate for a distance of 600 to 700 feet on all sides. Thus, except for the strips of ground required to support the hoist house, crushing plants and conveyors, the cableway can make a complete circle around the hopper. The hoist house is about 75 feet north of the hopper. It is set 12 feet above grade on concrete piles and will, consequently, not be affected by high water.



Cableway Mast, Hoist House, Initial Storage Pile, Primary Conveyor, and Crusher House.

Track facilities at the plant accommodate 40 cars. Tail tracks are arranged at a slight grade so that cars drop by gravity to the bins. From the bins gravity also carries the cars to storage tracks from which they are taken out to the main line.

It seems that in telling the story of the Arrow Sand and Gravel Company one is never through describing features which unite to make the operation one of the most efficient imaginable. There is nothing revolutionary about any part of the design but everything that has been done has been done well, and the result is a plant that can be depended upon for efficient operation not only under ideal conditions but also under unfavorable conditions.

An example of the care that was given to building a plant that would function properly in all departments, under all conditions, is furnished by the sprays under the head pulleys of the 3 belt conveyors. Wet sand and gravel which would be likely to adhere to the surface of the belt after it had gone over the head pulley and after most of the load had been discharged at the scalper, are removed by the jets of water that are thrown on the belt when it starts on its way back on the lower run. Any operator at whose plant a belt conveyor is installed will appreciate the wisdom



The Three-Way Loading Gate Arrangement Which Permits the Loading and Thorough Mixing of Three Sizes.

of freeing the belt of any adhering material.

The safety and comfort of employees was considered when the plant was designed. Walkways and railings are strongly built and provision has been made for keeping them well illuminated at night. Besides these safety precautions, the company has also taken pains to insure the protection of employees in case they should be in danger by the operation of the preceding process at any point. The cutting out of these processes is accomplished by buttons installed at convenient points. The hoist may be stopped instantly by a button located in the hoist house. The crusher, screens, and main belt conveyors may be cut out by any one of three buttons located at various points in the crusher house. The screens, crushers, main and secondary conveyors and all equipment in the crushing plant may be stopped by either of two buttons installed at the washing plant. The installation of these buttons, besides protecting the employees, serves in an important way to prevent the flow of material from clogging any particular piece of equipment.

If necessary, the Arrow plant can

be made to produce 3,000 tons a day. To do this, it would be necessary, of course, to resort to night operation and to keep the dragline working continuously. This can be done quite well, for the entire area of the deposit is illuminated by powerful flood lights located on the crusher house.

The plant is electrically operated throughout. Power is purchased at 15,000 volts pressure and is stepped down by

the company's own transformers to 400 volts. Individual drives are used on all pieces of equipment. Motors are of the slip ring type and switches are all of the fuseless oil type.

The plant was designed and built in 1921, by Mr. Stephen Stepanian, who is at the present time the general manager. Mr. Stepanian's contribution to the sand and gravel industry is a valuable one and his ability as a general manager seems hardly less than his ability as a designer, for the running of the plant is said to be exceptionally satisfactory.

Mellon Company, Dover, N. J. has incorporated for \$1,200,000 for the manufacture and sale of cement; E. F. Mellon, Wm. J. Harley, Pittsburgh, Pa., L. G. Eggers, Mount Lebanon, Pa.

Ionia, Mich.—Organization of a company is being effected to take over the holdings of the Benedict Gravel Company and the 160-acre farm of Gilbert Cutris. The company will be capitalized at \$150,000. It is estimated there are \$25,000,000 cubic feet of gravel in the plot. A lake 25 feet deep will be the first step in the hydraulic process. Operations are expected to start the first of September.





General View of Operations of the Arrow Sand Company



Secondary Conveyors; One Carrying Crushed Gravel, the Other Round Gravel.

Views of the Plant  
of the  
Arrow Sand Company  
—  
Columbus, Ohio



The Initial Storage Pile, in which is Always Carried a Reserve of 2,000 Tons



## ***“The Plymouth Locomotive***

The Frank Mitchell Contracting Company, North Carolina, is one of the big, prominent contractors of the South.

They have used Gasoline Locomotives in construction for a number of years and with “the Plymouth Gear Drive is the best buy on wheels they know whereof they speak.

Please read the letter in adjoining panel for more information about YOUR haulage problem and we will send you interesting literature.

**The Fate-Root-Heath Company**  
Plymouth, Ohio





*Best Buy on the Market"—*

*Frank Mitchell, Contractor*

**THIS LETTER TELLS WHY**  
The Frank Mitchell Contracting Co.  
Greenville, N. C.

The Fate-Root-Heath Co.,  
Plymouth, Ohio.

Gentlemen:

After having made a thorough study of all other types of locomotives, I purchased three Plymouth 7-ton Gear-Drive Locomotives and have been operating them approximately three months over very bad temporary tracks, with one 4 per cent, one 5 per cent, and numerous 2 per cent. grades. The locomotives have given perfect service, and will outpull any other locomotive of similar weight I have ever used.

I believe the 7-ton Plymouth Gear Drive is the best buy on the market. Yours very truly,

Frank Mitchell Contracting Co.,  
(Signed) Frank Mitchell, Pres.

Boonville Sand Corporation, Boonville, N. Y.  
An Unusual Plant and Deposit



View of One of the Conveyors and Screening Plants



Sand in the Bank is caved To Make It Run to the Bottom Where It is Picked Up  
by the Derricks



## Excavating Sand With Derricks

Long ago, when the world was younger, a glacier spreading out from the north, worked its way down the valley in which is now located the town of Boonville, New York. For many years the ground was covered over by the icy sheet which, for all its barren appearance and apparent usefulness, was carrying on activities that have a large bearing on some of the present-day activities of the section.

In its journey down from the north, the glacier had picked up large amounts of rock material. Frost action, landslips and the forces exerted by the glacier in its progress brought down great amounts of rock from cliffs and peaks overhanging the ice. At the toe of the glacier was a huge accumulation of rock that was pushed forward by the ice in its progress to the south. Frozen into the bottom of the glacier and grinding over the bed of the ice sheet, was another accumulation, the ground moraine. The glacial action reduced large amounts of the rock material to finer sizes. There were consequently available, sand and gravel sizes of all kinds and origins.

At the bottom of the glacier, running through a tunnel in the ice, was a sub-glacial stream, water produced by the melting of the glacier and finding its way to lower levels along the valley down which the glacier was tending.

The sub-glacial stream, running through the icy tunnel at the bottom of the glacier, deposited through successive seasons layer after layer of different kinds of materials on the floor of the tunnel. Alternate heat and cold caused variations in the flow of water and determined the kind of material that fell in each stratum. The glacier later receded and left the sand and gravel much as it is found today, a high ridged accumulation.

Such an accumulation was built up close to Boonville and now forms a deposit that is being operated by the Boonville Sand Corporation. The deposit is what is known as a kame, a short ridgelike bed of sand and gravel extending north and south. This deposit has some very unusual characteristics, the most remarkable of which are the depths of various horizontal strata of clean, clear sand entirely free from gravel. The grades of material are many. Approximately 60 per cent of the deposit as explored up to this time is suitable for concrete sand. About 10 per cent is gravel and the balance is made up of special grades. Among these special grades are asphalt sand, fine, medium and coarse core sands and certain filtration grades which test around 98 per cent silica. Magnetite is present in all grades but not in sufficient quantities to pay for the expense of extracting it.

The method of excavating the sand is as unusual as the deposit. Viewed from the side from which operations are carried on, the deposit appears as a high, steep face with well defined horizontal strata of different material. Keeping in mind that it is desired to recover material from the various overlying strata, it will be seen that the task is not an easy one. In general the operating method calls for keeping the bank worked away as nearly as possible to an angle of repose, of caving channels up through the various strata and causing a flow of the desired material to the bottom of the face, at which point each grade is loaded for its particular purpose or for reclassifying to meet certain requirements or specifications.

The work of caving channels is one of the most interesting in the entire operation and by far the most dangerous. To bring down a supply of any desired material, men go up the face

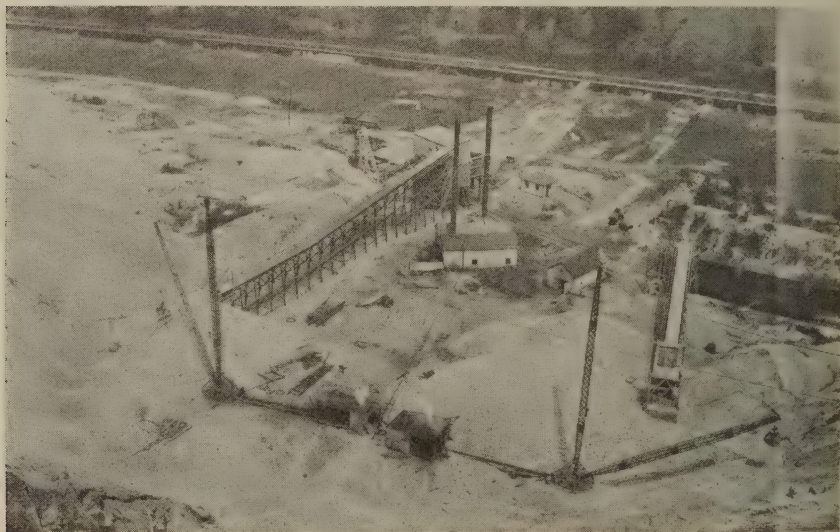
with shovels and slice bars. Usually two men work together, one doing the actual work of caving, the other standing by and studying the action of the sand so that he can give warning to the worker to get out of the way if an unlooked for slide is about to take place. The man who is actually doing the caving, shovels away material below the stratum to be caved, and then by working his slice bar around, causes a flow to the bottom, of the desired material. The work must be done by men who can keep their wits about them, for tons of sand are loosened at each caving and a number of men have already lost their lives by being caught in the sand streams running to the bottom.

At the foot are located 2 guy derricks made by the Dobbie Foundry and Machine Company of Niagara Falls, N. Y. These derricks are equipped with Hayward 1-yard buckets and operated by Mead-Morrison "Standard" hoisting engines. The derricks are so located that each has a large semi-circle at the foot of the deposit to work from. Any particular

grade of sand that has been run down from the face is picked up in the clam shell buckets and deposited into hoppers in back of the derricks from where it is conveyed to the screens and loading bins. Oversizes of gravel are crushed and re-elevated to a washer and screen.

This method of excavation will seem strange to most producers who are operating against banks with steam shovels. Undoubtedly the Boonvills Corporation would use shovels if they did not wish to reclaim particular grades and could load the sand as bank run material. The derrick method at Boonville has worked out very well. Mr. J. H. Wagoner, superintendent of the plant, has developed some interesting figures on the operation. Mr. Wagoner is an inveterate investigator and he knows, as a result of more than ordinary study of the situation, just how effective the derrick loading method is.

After the derricks have deposited their loads of material in hoppers, this material is carried back to screening plants on Robins belt conveyors run-



General View from Top of Deposit, Showing Dobbie Derricks and the Two Screening Plants.





The Screening is Done in Simply Designed Plants.

ning on trestles as shown in a number of the illustrations. On one side oversize material is carried through on the conveyor to the screening plant; on the other, it is scalped out by a bar grizzly. At one of the screening plants is an Allis-Chalmers 48 inch screen and a Wheeling crusher. The deposit contains material that is exceptionally free from foreign matter of any kind. It is such a deposit in this respect that every producer would wish to have and which comparatively few have. In the screening plant are turned out plaster sand and coarse brick sand by screening the concrete grade.

The steam plant consist of two 150 horsepower boilers which supply steam to all engines and to Worthington pumps that furnish the water supply. These Worthington pumps are located some little distance from the plant and it is necessary to run steam lines of considerable length to them.

The Boonville Sand Corporation has had an interesting operating experience. Only within the last few years has it been under the control of the

present management which includes Mr. H. R. Beebe, president, Mr. H. V. Owens, treasurer and manager and Mr. J. H. Wagoner, superintendent. The company maintains offices in Utica, New York, where a large part of the output is sold.

## The Annual Safety Council

The complete program of the twelfth annual Safety Congress, to be held in Buffalo from October 1 to October 5, has just been issued. In looking through the listing of industries, the particular hazards of which are to be considered, one finds only Portland cement, out of all of the pit and quarry industries. True, many hazards of these other industries, that are present also in, say a stone crushing plant, will be considered in such a way as to be of benefit to the crushed stone operator. However, we must confess to a little disappointment at finding reference to none of our industries except Portland cement. This, possibly, is due to a consciousness of the importance of our industries and the expectation of finding them included in every list of important activities of the country.

## Fairly Busy in Kentucky

### Producing All They Can Sell, Selling all Produced

(By Our Louisville Correspondent)

These are fairly busy times in Kentucky all the way around, with highway construction and railway extension a big factor in quarry work and in the sand and gravel business.

There was a letting of a little more than half a million dollars in road contracts at Frankfort about the middle of August and the R. B. Tyler Co., of Louisville was among the successful bidders. Some of the new contracts obtained by the R. B. Tyler Co., for road surface treatment include 6 miles of Jackson Highway in Hart County, 8 miles of the Lexington-Richmond road in Fayette County, another 8 mile stretch of the Jackson Highway in Larue and Hart County, and 6 miles of the Georgetown-Frankfort road. These new contracts, added to the construction and surfacing contracts already on hand, naturally make it busy days for the R. B. Tyler Company.

Among other concerns getting road construction contracts are Ellis and Smeathers, of Owensboro, Ky., who secured the contract for building 12 miles of road in Henry, Trimble and Carroll counties, involving a cost of \$271,123. This same concern also secured some bridge contracts.

There have also been some interesting lettings on the Indiana side, with the Scott Construction Company of Indianapolis getting one of the biggest contracts on the Shoals-West Baden road for \$213,742. Ellis and Schamhoeen of Rockport, Indiana, also secured quite a few road contracts in southern Indiana. Other successful bidders were S. M. Cunningham, of English, Ind., and A. B. Kremp, Jasper, Ind.

One of the biggest contract lettings in Kentucky lately was a contract for the Dix River Dam, the first step in a scheme for a \$12,000,000 power plant for Kentucky. The dam, which is up near Richmond, Ky., will cost approximately \$5,000,000 dollars. The contract for its construction was let to the L. E. Myers Company, of Chicago, according to announcement by L. B. Herrington, of Louisville, Vice President of the Kentucky Utilities Com-

pany which is undertaking the power development.

These are busy days, too, with the sand and gravel people operating on the river both in local trade and in carlot shipping. All the river plants here are operating at full capacity. They are not only keeping their delivery trucks busy, but are also doing a good out-of-town business in carload quantities.

The Ohio River Sand Co. furnishes an illustrative example. They report that they are busy as bees all around, both in local deliveries from the yard and in carload shipment and that they are also working to capacity in their river digging equipment. While help is scarce and cars may be scarce later on, they have so far been fortunate enough to keep plenty of help and cars with which to forward shipments promptly.

J. E. Lloyd, manager of the Louisville yard of the E. T. Slider Co., also reports good business, with plenty of cars available so far to take care of out-of-town shipments. These shipments are of goodly volume, and there is enough help available to keep things moving, so all they have to do is keep on working. The E. T. Slider Co., also operates a sand and gravel plant at New Albany, Ind., and a branch plant at Tell City, Ind., from which they serve some of their contracts and sand and gravel trade in southern Indiana.

## Nearly 4 Million Tons of Gypsum Mined

According to a statement issued by the Department of the Interior, compiled from statistics collected by the Geological Survey, the demand for most of the gypsum products was greater in 1922 than in 1921. During the year 3,779,949 tons of gypsum was mined, an increase of 24 per cent over the output in 1921. The sales of agricultural gypsum decreased from 104,966 tons, valued at \$490,902, in 1921, to 101,904 tons, valued at \$387,203, in 1922. The sales of gypsum for use in Portland cement paint, and other compounds amounted to 668,821 tons, valued at \$2,056,143, an increase over the corresponding figures for 1921 of 24 per cent in quantity and of 16 per cent in value.



# What is the Best Aggregate for Tar Macadam?

By ALFRED B. SEARLE,  
Consulting Technologist

Paper read before The Institution of Quarry Managers at Llandudno, N.W., June 28th, 29th, 30th, 1923, and printed in *The Quarry Managers' Journal*.

**A**NY answer to the question: "What is the Best Aggregate for Tar Macadam?" must show clearly what is understood by the word "best." A comparison of the quality of the various aggregates available may be based on three considerations:—

- (a) What is the best as regards technical fitness of the aggregate as a stone, and apart from the binder and from any question of cost?
- (b) What is the best aggregate as regards the durability of the road as a whole, apart from the cost of repairs?
- (c) What is the best as regards cheapness of maintenance?

I do not propose to consider the question of price or cost of maintenance, because the data for an adequate answer to that question is not available, and many of the figures which have been published are of very doubtful value as a basis for generalized conclusions. They may correctly state the costs for the local conditions to which they refer, but, unless the whole of the circumstances are realized, it is unwise to extend the figures indefinitely. So many factors enter into the question of relative costs that I prefer to leave that part of the subject for the present. Besides, cost is not always the most important factor, and its consideration really ought to be left over until the more important questions of technical suitability and of durability have been settled.

## What is the Most Technically Suitable Aggregate?

It is surprising how little reliable information has been published with respect to the properties of different aggregates from which we may reach a sound conclusion as to which is technically the most suitable for use in tar or bitumen macadam.

Some quarry owners who are blessed in the possession of stone of exceptional hardness or of remarkably high crushing strength naturally urge that these two qualities are of paramount importance. Another quarry owner is equally clamant with respect to the importance of toughness; and others very properly draw the attention of their customers to the necessity of roughness of surface (so as to provide a "key" for the binder) porosity, so as to absorb and grip the binder. In addition, a road material must be resistant to weather and climatic changes.

Amidst this clamour of the merits of rival properties, what is the poor road-maker to do? If he is very inexperienced he will probably attempt to secure a stone which possesses in the highest degree crushing strength, hardness, toughness, porosity and gripping power; but he will soon find that some of these properties are quite incompatible, and that he must sacrifice one or more in order to retain the others.

## The Effect of Repeated Impacts

Of the widely available stones, granite and trap rocks are by far the hardest, and have the greatest crushing strength, but some granites and trap rocks are so brittle that they are not

particularly suitable for withstanding the repeated blows to which they are subjected when in use. For a stone to be able to withstand innumerable blows, it must possess "toughness"—a property which it is easier to recognize than to define. Yet it is, because properly made vitrified paving bricks are exceedingly tough and resistant to oft-repeated blows, so that they frequently produce more durable roads than other much harder materials.

A lump of pure glass—clear as crystal and limpid as water—may be extremely hard, and it may have a crushing strength approaching that of granite; but, if subjected to a hundred blows from a small hand-hammer it will shatter into fragments. If a similar piece is made of a turbid dark coloured glass, rich in aluminous material, it will withstand many more blows, and, as a result of the difference in its composition, it will be tough, as well as hard and resistant to crushing. I am not, of course, suggesting that roads should be made of aluminous glass, but have used this as an illustration that toughness is quite distinct from either hardness or resistance to crushing. Some basalts are actually harder than some granites, but are useless for road-making, because they are so brittle that they are readily fractured by small blows. Yet, if subjected to a steadily increasing pressure, they will show an enormous resistance to crushing.

As the forces to which a road material is subject consist chiefly of oft-repeated blows, toughness is really more important than either enormous strength or maximum hardness, though both these properties are essential.

A road-stone must clearly be hard enough to resist the grinding action of the wheels and horses' hoofs, and it is not difficult to compare the resistance of various stones in this respect by subjecting them to a grinding action, using an abrasive wheel of known hard-

ness, applied at a pre-arranged pressure.

### Importance of Crushing Strength Over-Estimated

The results of tests of crushing strength are of small value in determining the suitability of a stone for tar macadam, because the crushing strength of almost any stone likely to be used for roads is far greater than the pressure to which it will be subjected when in use. The only stones rejected by a crushing test are some shales, dried clays, and a few of the weaker and more friable sandstones and ragstones.

If the maximum crushing force which is likely to be applied to a piece of stone on a road is under 200 tons per square feet, there is no particular virtue in discarding stones with a crushing strength below 500 tons per square foot. For this reason there is no technical importance in employing stones of enormous crushing strength to the exclusion of others of much less yet ample strength.

The toughness of a stone can only be tested by subjecting it to repeated blows in an impact or hammering machine, or in a "rattler." These tests are intended to subject the stone to a far more intense hammering than they are likely to receive in practice, and the results are fairly reliable as regards block stones.

It is extremely difficult to apply the ordinary impact test to the small and irregular pieces of stone used in tar macadam, and I am by no means satisfied that the rattler test (which consists in partly filling a horizontal cylinder with the stone to be tested and with cannon balls, and rotating it one thousand times) really gives the required information. Such a test gives very valuable figures when applied to bricks and blocks, but, with smaller stones, the figures of consecutive tests on a material are often far from concordant, and suggest that the shape of



the individual pieces of stone exercises a greater influence than is often realized.

### Weather Resistance

Resistance to weather is very difficult to determine, but, fortunately, there is seldom any need to make actual tests, as the stones generally used for roads in this country are all weather resisting.

### Natural Stones v. Slag

From the point of view of technical suitability, natural stones may usually be placed in the following order:—(1) Traps and granite; (2) Limestone; (3) Sandstone; most other stones being of relatively small value.

These stones must be selected before use, as not all of those mentioned as suitable are equally good for roads.

Granite, for instance, is generally hard and durable, but there are several kinds of granite which are much inferior to others. A granite containing a very large proportion of quartz for instance is usually too brittle to be of service in main roads; a highly felspathic granite such as some of that in Cornwall, is too easily decomposed by the weather, and a highly micaceous granite splits too readily into thin leaves. Similarly, gneiss is often too stratified to be satisfactory as a roadstone, but syenite (a granite rock containing little or no quartz) is one of the best roadstones.

Among the artificial stones, the most important are vitrified bricks and slags. Pieces of brick are not used in tar macadam roads, and so need not be considered at present, though statistics prove that suitable bricks are an excellent road material.

Slag is a delusive road material. Some of the slag obtained from the oldest heaps is very tough and dense, but much of the slag made in recent years is much more brittle, more porous, and (as a result of a higher lime-content) it is much less resistant to the weather. I have examined professionally a num-

ber of slags which slaked and fell to pieces if carefully wetted, and left in a damp state for a week, owing to the disintegrating effect of moisture on some of the di-calcium silicate present in the slag.

The firms who produce slag obtain it as a by-product; they make it merely as a means for removing certain impurities from the iron, which is their chief product. Consequently, their attention is concentrated on a slag which has the necessary chemical and physical properties to suit their requirements as ironmasters, and if it suits them (as, in fact, it does) to increase the fluidity of the slag by using a high proportion of lime, it will pay them to do so, even though the slag is thereby made quite unsuitable for road making.

It does not pay an iron-master to consider the properties of the cold slag; his interest is solely confined to the molten material. Consequently, it is merely a coincidence that some slags happen to have the properties required in an aggregate for road material. Those slags which do possess these properties are useful; but, with the ever increasing tendency to use higher temperatures and to produce more fluid slags, the number of slags suitable for road-making is likely to diminish rapidly. Comparatively few of the up-to-date iron-masters now produce a slag which is good for roads.

In this connection it is interesting to note that Middlesbrough—which is in the heart of the slag-producing country, with an enormous slag-producing influence on its local authority—has abandoned the use of slag for roads.

The objections to slag as a road material the inherent in its glassy character. It is hard, yet brittle (unless carefully annealed, which is expensive.) A solid, dense slag has ample crushing strength, but a low resistance to impact. If a slag has a honeycomb structure, its crushing strength is

greatly reduced, and may fall below that required to support the loads imposed on it during use. Consequently, highly porous slag should not be used for roads. On the other hand, a dense slag with a glassy conchoidal fracture, is so deficient in adhesion that it is very unsatisfactory as an aggregate for tar macadam.

There is a curious idea in the minds of some surveyors that slag enters into chemical combination with tar, and that the product is stronger than either the tar or the slag taken separately. I have most carefully investigated this subject, and, so far, have failed to obtain any evidence of an increase in either tensile or crushing strength, due to any chemical combination of slag and tar. Until further evidence is forthcoming, I conclude that no such increase occurs.

I have been able to obtain an appreciable increase in the strength of a mixture of tar and dense slag by previously heating the slag with fused nitre cake; this attacks the surface of the pieces of slag, roughens them, and so affords a better grip or key for the tar. The cost of treatment is prohibitive, but the experiment is interesting, as showing that, by increasing the roughness of the surface of the slag, a better adhesion of the tar is obtained.

On the whole, slag is inferior to the natural stones generally employed for roads, and, whilst it may be used for minor roads, it is seldom suitable for first-class roads or highways.

### Which Aggregate Makes the Most Durable Roads?

Leaving the technical suitability of different stone, we may next consider which is the best aggregate, so far as the durability of the road is concerned.

Many factors enter into the answer to this question, of which the most important are:—

(1) The size and shape of the pieces of aggregate; (2) The nature of the

tar or bitumen; (3) The nature of the foundation of the road; (4) The proportion of aggregate and binder; and (5) The manner in which the materials are mixed and laid.

Several of these factors are outside the immediate scope of this paper, so that, for the present, it is sufficient to consider the first and fourth, namely, the effect of the size and shape of the pieces of aggregate, and the proportion of aggregate to binder on the durability of the road. At the same time, the importance of the other factors must not be overlooked for in a considerable number of cases the rapid destruction of roads has been due more to a bad foundation, to an unsuitable binder, or—still more important—to faulty mixing and laying of the macadam, than to fault in the aggregate itself.

With regard to the shape and size of the pieces of aggregate, it is clear that they must not be too large, or they would extend above the desired thickness of the road. Opinions differ greatly as to what is the most suitable size, but a little thought will show this must be based on two considerations:

- (1) The thickness of the material when laid.
- (2) The necessity of having a material of maximum density.

### Grading the Aggregate

It is a useful rule to insist that 95 per cent of the material shall pass through a ring whose diameter is three-quarters of the thickness of the road material when laid and rolled. Thus, if the road material is to be 2 in. thick when finished, 95 per cent of the aggregate must pass through a ring of  $\frac{3}{4}$  of 2 in., or  $1\frac{1}{2}$  in. diameter, and none of the aggregate must fail to pass through a 2 in. ring. Some engineers rightly consider this rule provides pieces of too large a size, and they prefer all the aggregate to pass through a  $1\frac{1}{4}$  in. ring.

It is not enough, however, to stipulate a maximum diameter for the



pieces of aggregate. If all the pieces were the same size, any stone would be unsuitable for a first-class road. The pieces must be of several different sizes, in order that they may form a sufficiently compact and dense mass.

In this connection I am often surprised that more use is not made of the numerous investigations on the size and shape of the pieces of aggregate used in reinforced concrete. This material has been so fully examined and so much time has been spent upon it by technical men of all grades that the results of their work afford a veritable treasure-house of information of inestimable value to the roadmaker.

Without going too much into detail, I may remind you that the densest and most durable concrete is that which contains the maximum volume of aggregate consistent with every particle being covered sufficiently thickly with a coating of binder.

Applying this principle to a tar- or bitumen-macadam, I would divide the stone into four sizes, namely:—

(a) Pieces less than  $1\frac{1}{2}$  in. and greater than 1 in. diameter.

(b) Pieces between  $\frac{1}{2}$ -in. and 1 in. diameter.

(c) Pieces between  $\frac{1}{4}$ -in. and  $\frac{1}{2}$ -in. diameter.

(d) Pieces less than  $\frac{1}{4}$ -in. diameter, but free from dust.

### Securing Maximum Density

In order to produce a mixture of maximum density, either of two methods may be used. Each of these four sizes of stone may be mixed in definite proportions, so as to secure a uniform grading. Under some conditions, this would be secured by using 40 per cent of size (a), 40 per cent of size (b), 10 per cent of size (c), and 10 per cent of size (d). These proportions would only be correct if the sizes of the pieces in each group were properly balanced, and, as this is very seldom the case, it is far better to proceed as follows;—

A suitable quantity of stone of size (a) is placed in a large measuring vessel, until the latter is filled exactly to the brim, or to a fiduciary line. The vessel, with its contents, is then weighed and water is poured in until it exactly reaches the top of the stones. The vessel and its contents is again weighed, and the quantity of water added is thus ascertained.

The stones are removed from the vessel, and are mixed with a volume of stones of size (b), equal to the volume of water required to fill the voids or interstices in the stones, and the mixture is placed in a similar, but larger vessel, weighed, and the voids or interstices are again filled with water, the amount required being ascertained as before. The water is poured off, and the stones mixed with a quantity of stones of size (c), equal in volume to the second quantity of water added. The amount of spaces or voids which can be filled with water is again determined, and stone of size (d) is then added to correspond to this water.

In other words, the voids or spaces between the particles of stone of a certain size are filled, as far as possible, with the stones of the next smaller size, this process being repeated until the smallest size is reached. In no other way can so dense and compact a mass of stone be produced.

This method will usually be regarded as much too costly for use in roads, though I am not sure that such is the case when the greater durability of the roads and the saving in binder is considered. It is not, however, necessary to separate the stones in this way on the large scale. All that is required is that the mixture should consist of suitable proportions of stone of the various sizes to produce a minimum of voids, and a maximum of compact stone. In many instances it will suffice if large samples of the stone are tested periodically, and the neces-

sary corrections are made by adding suitable proportions of the sizes in which the mixture is deficient, or in adjusting the crushing or screening plant, so as to produce the desired sizes in the required proportions.

Just as the best concrete cannot be made by mixing aggregate, sand and cement in the ratio of 1: 2: 4 or in any other definite arithmetical proportions (unless these proportions happen to be those required by a particular sample of aggregate), so it is equally impossible to obtain the best road material without definitely ascertaining by trial that the mixed stone does contain the maximum of stone and the minimum of voids, and the grading is regular from the smallest to the largest sized pieces.

#### The Sizes of Pieces of Aggregate

In connection with the size of the pieces of aggregate, it is also essential to recognize the great importance of using two aggregates—a coarse one of stone, and a fine one of sand. Many engineers omit the sand because this material consists of small particles with a very high percentage of voids, and, consequently, requires more tar or bitumen than a coarser stone. In many cases the increased amount of binder which is supposed to be required, wholly mythical, and actually more binder is used with some stones from which all fine stone has previously been screened than would be used if 25-30 per cent of sand were added. The objection to the use of said or stone powder is largely fallacious. The fact is that, provided there is not an excess of powder, and also that it is not in the form of "dust," the greater proportion of voids filled with sand, the more compact and durable will be the road.

The objections to quartz in the form of stone do not apply to it in the form of sand; on the contrary, quartz sand is one of the best materials for filling the smaller interstices between the

properly graded stones, and so serves as an efficient means of reducing the proportion of binder required.

The sand or stone-powder must not be too fine, or it will not serve the desired purpose. Usually it should be retained completely on a 50 mesh sieve. Like the stone, the grading should be regular, and the sand should not contain an undue proportion of material consisting of grains of one size.

#### The Shape of Pieces of Aggregate

The shape of the pieces of aggregate should be what is known as subangular, *i.e.*, they should not be complete spheres, but should have many angles, yet they should not be much greater in any one direction than in others. Long thin pieces are very undesirable, as they do not produce the most compact mass. For this reason, slotted screens should be avoided.

Stones which break into pieces with rounded edges are as undesirable as those which readily form flakes. The most compact masses are formed by pieces which have their length, breadth and thickness almost equal, but have more angles than a cube or sphere. It is obviously too costly to select the pieces of stone too carefully, but the shape just mentioned gives the maximum amount of interlocking, and, therefore, affords the greatest strength to the mass apart from the binder.

The interlocking of the pieces of stone has a further important influence, and it is therefore very desirable to select stones which, when crushed, form pieces which interlock readily, even if this means the sacrifice of some hardness or crushing strength. It is of very great importance that, when a tar or bitumen macadam road is laid and finished, the stones of which it is made should be of such a shape, and so firmly fixed, that they will not move when the road is used. If any movement occurs, the surface of the road will be adversely affected, and its dur-



ability will be lessened. Not only so, but if the stones are capable of being moved by the pressure of the traffic on the road, it is clear that the road does not possess the necessary resistance to pressure and its durability, on this account, will be low. This is one reason why many macadam roads made with tar are so much less durable than those made with bitumen, the same stone being used in both cases. The fault is not always with the binder; it is sometimes due to the shape of the pieces of stone, to too many pieces being of the same size, to an absence of piece of stone of certain intermediate sizes, and to the use of too large a proportion of binder.

The importance of screening and mixing the aggregate in such a way as to secure a mass of maximum compactness, and of avoiding a larger proportion of binder than is absolutely necessary, is seldom necessary, yet failure to achieve these two essentials may halve the durability of a road. For the durability of a road is not the "average" wearing power, as the surface must be renewed as soon as the least durable portions are unduly worn. Moreover, when grooves or ruts are formed, the breaking down of the surface takes place more rapidly than the ordinary starting of grooves. No matter how hard or tough the aggregate, if holes, ruts or other depressions are allowed to remain unrepaired, the surface will wear away with abnormally great rapidity.

### Conclusion

The considerations I have placed before you show that no single kind of stone can, under all circumstances, be the "best" aggregate for tar macadam. The greater toughness of a material may make it more durable than another having a much greater hardness. The nature of the mass produced when pieces of aggregate are crushed by the traffic will also make a great difference to the durability of the road. Great

resistance to crushing is not necessarily an advantage, and may confer no benefit if a material is brittle, like some kinds of slag or basalt. On the other hand, a stone which is unduly soft may be worn away by the abrasive action of the traffic.

So far as the physical nature of the stone is concerned, toughness or resistance to repeated blows is probably the most important single property, but, if an aggregate consists of pieces of subangular shape, and of such sizes that the various pieces interlock well together, forming a mass with a minimum of voids, it may produce a more durable roadway than that made of a tougher material which has been less skilfully graded.

Engineers interested in road construction would do well to pay more attention to the causes which produce such great strength in paving bricks, and in re-inforced concrete, and if similar forces were brought into play to a greater extent in the selection and preparation of aggregate for tar macadam, much better roads could be produced from these materials.

May I, in conclusion, remind you that, just as it is useless to lay great stress on the crushing strength of the bricks, when a wall is built with poor mortar, or with too much of it, because the strength of the wall is, ultimately, the strength of the mortar, and seldom exceeds one-tenth of the crushing strength of the bricks, so it is equally useless to apply excessively rigid specifications to the crushing strength or any other property of an aggregate when the road is constructed with a poor binder or with too much of it, or when the shape and size of the various pieces of aggregate do not enable a mass of maximum compactness to be produced.

In short, if tests were applied to the roadway, or to pieces of the mixed material treated as though they were to form part of the road, rather than

to the stone used as aggregate, much more knowledge would be gained of the true relative value of various aggregates. Some experiments of this kind made by the author seem to show that, under favorable conditions, a limestone aggregate properly graded and saturated with binder, will produce a roadway which is equally as resistant to abrasion and to repeated impacts as many existing roadways made of granite, trap and other much harder stones. The reason for this difference is probably to be found in the better grading of the limestone, whereby the separate pieces of aggregate, when once in position, are so interlocked that they do not slip, even under the heaviest traffic, whereas the harder and smoother pieces of granite and trap rocks, when graded less skillfully, do not form so compact a mass, and so the surface of the road is more readily distorted, and, therefore, wears away more rapidly. Further consideration of these experiments must, however, be left to a future paper.

## Changes in Worthington Organization

Mr. E. L. Sanborn who, up to this time, has managed the Chicago office the Worthington Pump and Machinery Corporation, has been transferred to the power and mining machinery works of the company at Cudahy, Wisconsin. Making Cudahy his headquarters, Mr. Sanborn will take charge of the crushing, cement, and creosoting machinery sales department.

Mr. George W. Shores, formerly of the Worthington New York office, will have charge of sales in the power and mining machinery department of the Chicago office from which he will cover the states of Michigan, Indiana, Kentucky, Illinois, Missouri and Iowa.

Mr. F. T. Agthe, formerly of the Worthington Cudahy works, has been transferred to their Pittsburgh office where he will take charge of power and mining machinery sales. Working out of Pittsburgh, Mr. Agthe will cover the western half of Pennsylvania, all of Ohio and West Virginia and parts of Maryland and North Carolina.

## Effective Publicity for Lime in Concrete

"Nineteen Stories of Lime," is the title of an attractive booklet that has just been issued by the central division of the National Lime Association. The nineteen stories are accounts of that number of successful jobs in which lime has been used with concrete. The story in each case is carried entirely in a letter from the architect or engineer in charge of construction. Each of these letters makes a good case for lime and, published together in the booklet as they are, constitute, as a group, an effective means of promoting the greater use of this valuable material.

The booklet, 50,000 copies of which will be distributed in the central division, would seem sure to receive a good reception. The cover and body are attractively printed in three colors, making the work attractive in appearance as well as convincing in content, for the content is convincing.

All of the letters that are reproduced give unqualified praise to the plan of using lime in concrete construction. Letters are accompanied in each case by good illustrations of the construction jobs to which reference is made. In various places throughout the book are also shown illustrations of other structures in which lime concrete was used, but which were not selected for inclusion among the nineteen stories.

The book is published without preface or introduction, and it needs neither. The strength of the testimony that is given by the satisfied users of lime, makes it unnecessary for the lime producers themselves, as an association, to say anything in their own behalf.

We regard this as an association activity which should be productive of considerable good. The publication of this book cost real money, but there is every reason to suppose that the amount expended will be well justified by the immediate and future benefits that will result.

Clinton Sand & Gravel Company, Clinton, Illinois has incorporated to mine and deal in building materials. The capital stock is \$10,000. The incorporators are H. A. Campbell, A. E. Stone, Roy H. Johnson, Onnis Harrold and W. F. Gray.



## Report Heavy Loadings

### Railway Association Shows Sand, Gravel, Stone Record

(By Our Washington Correspondent)

Secretary Barrows of the National Sand and Gravel Association, states that, according to information he has received from the American Railway Association, the loadings of sand, gravel and stone for the week ended July 28 last, totaled 56,632 cars. Secretary Barrows says that this is the largest week's loading in the history of the industry and the second time during the month of July that the loading exceeded the 55,000 mark. He attaches a great deal of importance to these figures, which he contends shows the importance of the industry as well as its growth. He adds that the industry is somewhat handicapped in the South because of a car shortage, but when this is remedied he expects the loadings for the whole country to reach the 60,000 mark.

For the week ending July 28, it is also reported by the association that the total revenue freight loaded was 1,041,044 cars, which is the highest figure that American railroads have ever attained. This figure marks an increase of 12,117 cars over the previous week's loading of 1,028,927 cars, which was the highest up to that time. It is also an increase of 192,186 cars over the corresponding week of last year and 245,612 cars over the same week of 1921.

Encouraging reports are being received from the membership as to their progress in putting into effect the various recommendations of the association for securing the fullest possible use of the available transportation facilities. For instance one members' records indicate that he has maintained an average loading of 59 tons per car for the past seven months, and Secretary Barrows says if all exert a strenuous effort along this line it will eventually mean more cars for everybody.

It is announced by Secretary Barrows that the executive committee of the National Sand and Gravel Association will meet in Chicago the latter part of September. It is not known at this time where the meeting will be

held. Secretary Barrows says that so far as he knows now only routine matters will be considered.

Of 6,500 miles of completed Federal-aid road, for which statistics have been collected by the Bureau of Public Roads, one-half has been constructed of 16 and 18-foot width, 25 per cent of a greater width, and 25 per cent of a less width. As would be expected, the wider roads have been constructed largely in the more populous states, although some of the less populous states are building wider roads for the main highways. There is a general tendency, it is said, to build wider roads to meet the needs of the constantly increasing traffic, as shown by the 25 per cent of the mileage over 18 feet in width, 7 per cent being 24 feet or wider. At the same time the bureau states that few highway bridges with a width of roadway less than 18 feet are now being constructed on improved roads. In the past some of 12 feet and a good many of 16-foot width have been constructed in an effort to economize, but it has proved short-sighted economy. Only one line of traffic can pass over a 12-foot roadway and 16 feet of width will not accommodate two lines in safety. Many of the states, such as Pennsylvania, New Jersey, Ohio, and Massachusetts, have found it advisable in replacing old bridges on important roads, to make them wide enough to accommodate three and four lines of traffic.

The cost of grading for highway construction apparently has reached a stable condition, according to the bureau. The average cost per cubic yard for grading on Federal-aid roads rose from 38 cents in 1917 to a peak price of 66 cents in 1920, and has since gradually declined. On Federal-aid work contracted for recently, the average price per cubic yard for the whole United States was 33 cents in April, 32 cents in May, and 34 cents in June. The cost of other items entering into road work also shows a general tendency toward stabilization, although in many cases not as marked as that for earthwork. A great variation in the conditions under which grading is done in different sections of the United States is reflected in cost data compiled by the bureau on 1,350 miles of Federal-aid road. The figures cover the four-year period, 1917-1921, and are based on a total of 241½ million yards of earth.

## Activity in Memphis

### Building, Road and Street Construction Holding Up

By Our Memphis Correspondent

The last sixty days have found a very large activity in the Mississippi Valley and adjacent sections of the southwest and southeast, with the gravel, crushed stone, sand and cement trades. Following an unusually wet spring season, with the usual retarding effects, the summer has been alive with road work, culvert work, bridge work and incidentally construction, both business, residential, municipal and public work. A great deal of the latter class of work started in the spring and summer or planned then is now barely getting under full headway. Here in Memphis foundation work is now in progress on two large skyscrapers in the heart of the downtown section, with much concrete work to enter into the buildings on the strength of contracts let some time ago.

Sites are to be cleared within the next few weeks on a corner at Union, Second and Third Sts., Memphis, for a 12 story 600 room hotel, also on the corner of Union and Front for a third 12 story office structure. Soon to start is a large 2 story addition to the Cossett Library on the river front at the foot of Monroe, next to the Custom House, opposite the new Shrine building and with rear frontage rights on the banks of the river. Red sandstone similar to the present library will be used in this structure. The Security Building at the corner of Madison and South Front will have an exterior of white stone. Bedford stone is also being used in the lower floors of the 15 story Tri-State Hotel, Main and Adams, Memphis, now up to the 12th floor, with much of the reinforced concrete work yet to be completed. A similar status of work lacking many months of completion but well under way is the million dollar Auditorium at North Main Street and Poplar Ave. The group of buildings at the Southwestern College, for which Arkansas stone from Bald Knob, Ark., is being shipped will be constructed entirely of stone. The Parkview Hotel, at Overton Park and Poplar has the frame work up for about 10 floors, the J. S. Clarkson Co. plumbing building

on Court Street near North Fourth is partly up for the reinforced concrete features. The Dermon building at Third and Jefferson, to be occupied by the Memphis Lintoye Co., is undergoing excavation work now. The site for the Shelby county jail is to be cleared soon on Washington Ave. north of the Court House. The Bellvue subway, one of the important pieces of engineering work this year, will be started in a few weeks by the City, the Southern Railroad and the N. C. and St. L. Railroad. W. F. Schulz has been selected as engineer. He was engineer of the recently completed Memphis River and Rail Terminals, a million dollar project to be formally dedicated in the Fall and extending one mile along the river front in the southwest part of the city. Jefferson Ave. is to be opened shortly at a cost of some \$150,000 across the Southern yards in Memphis, and the street leading from the river front to the extreme east city limits will then be a very important boulevard, second only to Madison, Union, Poplar and the streets long so used. Considerable concrete and cement work, involving the use of crushed stone, sand and similar materials, has still to be done at the Memphis Artesian Water Co., North Parkway, a \$2,000,000 project to be completed in another year. The water mains are now being laid over a large area. The Memphis Light and Power Co. also has in progress a gigantic undertaking in the permanent rebuilding of its plant.

Highway work is going forward in a big way in several counties of West Tennessee, Dyer, Haywood, Carroll and Gibson among them. Also considerable work around Union City in Obion County. During the last thirty days Haywood County through its Court voted \$150,000 for highway work on the Bristol to Memphis Highway links. Phillips County, Ark. (Helena) now with a fine system is completing several links of concrete highway. Considerable work is in progress in Mississippi counties. On August 10, the Tennessee Highway Commission at Nashville, Tenn., let contracts in a number of Tennessee counties for connecting links of highways in Middle, East and West Tennessee. Three gravel projects of moment were let, others were stone base penetration projects.

Sand business is very good in Memphis and vicinity due to the large



amount of building construction, business houses, apartments and public structures and foundation and culvert work. There is quite a call for gravel and crushed stone for repair work on roads built a few years ago. In the matter of railroad work several of the lines are putting in concrete and ballast at various points and a few branches are under construction. The Rock Island and Missouri Pacific have let during the summer some large contracts. Considerable material for this work has been shipped from Arkansas pits and quarries. Figures compiled from an authoritative source show that the week ending July 28 made a very fine showing in gravel shipments in the south-west section.

The Greeneville Stone and Gravel Co. of Greenville, Miss., with Memphis offices on Walnut St., are filling numerous contracts for gravel on road work and for building purposes, and are quite active at Greeneville on the river. The crushed stone plant at Williford, Ark., inactive all the year, is also getting some good new business and the Wolf River Sand Co., is doing a fine summer trade in sand.

The Missouri Portland Cement Co. U. and P. Building, Memphis, made in 1923 several important additions to their loading and unloading plant on Wolf river, just to the north of Memphis and are now using cars principally where in former years they used boats. They are very extensively in the cement, gravel and sand trade, both local and shipping.

The Central Sand and Gravel Co. have a plant along the Mississippi river in the south part of Memphis.

The Allen Gravel Co. reports first class summer activity. Demand is good, labor somewhat scarce, cars at the present time plentiful, though, when the harvest and coal moving season starts, they are apprehensive they may not be so plentiful. Accordingly many customers are pushing up orders, asking early delivery and a good many are storing where it is possible to do so. They are featuring Tishomingo gravel, which is held in high favor in the highway work. The pits are near Iuka, Miss.

The Memphis Stone and Gravel Co. is furnishing gravel and stone for many highway projects this season, also some railroad ballast. They have pits and quarries in Tennessee around Camden, in Mississippi near Iuka and in Arkansas.

## Road Show Plans Nearly Completed

Plans for the 1924 convention and road show of the American Road Builders' Association have practically been completed. These two events are to be held simultaneously the week beginning January 14th. The convention headquarters are to be in the Congress Hotel. The road show will be held in the Coliseum and the adjoining Greer Building.

Mr. Frank Page, president of the American Road Builders' Association, has appointed Mr. Charles M. Upham manager of the convention and road show. Mr. Upham will report directly to the executive committee of the American Road Builders' Association. With the approval of that committee, Mr. Upham will appoint several committees to handle various features of the two big events of the year in the highway industry.

Mr. Page and Mr. Upham spent some time recently in Chicago, making detailed arrangements for both the convention and the show. As a result, all the important preliminaries are already completed. Work also is being pushed on the whole program in such manner as to give ample time for all concerned to make their plans.

Mr. Upham will open an office in Chicago well in advance of the date of the convention and road show. Meanwhile, arrangements are being made so the date of drawings for space in the road show may be announced shortly. General features of the convention also have already been mapped out to an extent that will permit the details to be determined before the end of September.

Mr. S. F. Beatty, president of the Highway Industries Exhibitors' Association, has advised Mr. Page and Mr. Upham that that organization will co-operate in every possible way to make the 1924 road show and convention successful. With the two organizations working together in close harmony, maximum results for both these events are assured.

All inquiries regarding the convention and road show should be addressed to the home office of the American Road Builders' Association, at 37 West 39th Street, New York City, until the announcement of the location of the temporary Chicago office has been made.

## Pittsburgh Prices Stable

### River Producers Report Plenty of Good Business

(By Our Pittsburgh Correspondent)

There is no apparent lag in the activity in sand gravel operations in the Pittsburgh, Pa., market. Producers are not only active on the rivers, but are getting a good distribution throughout this district, while nearby southern interests are calling heavy on the local trade for material. Leading sand and gravel companies are also giving considerable attention to dock-dredging and other work allied with the river traffic, and there is a keen demand for work of this character before the winter sets in.

The marked stability of price levels holds without change. Best river sand, operating under a good tonnage call, is selling at \$1.00, f. o. b. float, with some quotations at \$1.05 and \$1.10. Delivered stock is proportionately higher and motor trucks are being used to fine account in this connection. Producers are disposing of practically their entire current output, and stock reserves are not piling up to any appreciable extent.

Good washed gravel maintains at \$2.00 a cubic yard on the dock, while f. o. b. float sales continue at \$1.60 and \$1.65. As in the case of sand, there is a good call for the material, and the market up to the present time shows no evidence of sagging. Retail dealers are asking \$2.50 a cubic yard, and upwards, according to length of haul.

Portland cement is now priced at \$2.24 per barrel in the Pittsburgh market, wholesale, in cargo lots, less bags. This figure is only a slight advance, less than 15 cents, over the quotation at this time a year ago, despite the fact that labor costs have advanced at the mill and that distribution costs have also increased. There is a fine demand for the material, with no signs of abatement. Dealers price the standard brands of cement at \$3.50 a barrel, delivered on the job, with 10-cent bag rebate. Crushed stone is selling at \$2.85 a cubic yard in carload lots in the wholesale market, both  $\frac{3}{4}$ -inch and  $1\frac{1}{2}$ -inch sizes.

No less than 112,422 short tons of washed gravel were distributed from the Monongahela River during the

month of June, the last month for which accurate figures, compiled by the local Federal engineers, are available; the sand tonnage from the same river in this month totaled 148,220. On the Allegheny River, the output was 103,539 tons of gravel, and 131,333 tons of river sand; while on the Ohio River, the gravel tonnage (short tons) aggregated 125,898 during this month, and sand, 122,131 short tons. These figures give an impression of the current production that is going forward.

The Iron City Sand Co., is operating under its regular production schedule and its fleet is one of the most active on the Monongahela River. The steamer "P. M. Pfeil," is hauling heavy tows of barges to different points on the stream, and empties are likewise being distributed to best account for immediate utility for reloading; the company sand-dredgers are active. The Pittsburgh City Council is considering an ordinance for leasing property to the company on the Monongahela River wharf near Exchange Way; the plans provide for a site for a timber wall or dock of temporary character, occupying an area, 200x200 feet, extending from Water Street. The company purposes to use this for additional shipping service and will provide storage bins and other facilities for such operations. The company's landing on the Allegheny River is also a busy spot these days.

The Rodgers Sand Co., is active on the Allegheny River, vicinity of Twelve-Mile Island, and is using its dredgeboat, "Topsy," for sand and gravel production at this location. The company has nine towboats and two gasoline towboats in its fleet, and practically all of these are being kept in active service. There are two truck and wagon docks, eight rail docks and one coal dock in commission.

The J. K. Davison Sand & Gravel Co., continues on the heavy production list in this district. A large fleet is in service on the river, and number of repairs recently have been made to the equipment, including important work on the dredgeboat "Elizabeth Smith," again in active operation.

The Bound Brook Crushed Stone Company of Chimney Rock, N. J., suffered a heavy loss by fire which destroyed their plant. Loss is estimated at \$250,000. However, plant will be rebuilt at once.



## Governor Likes Gravel

### Ohio Executive Friendly to This Road Material

(By Our Cincinnati Correspondent)

Friendliness of the administration of Governor A. V. Donahey to the policy of construction of gravel highways was demonstrated the past week when the Governor, accompanied by State Highway Director Louis A. Boulay, inspected gravel road systems now in use in parts of Ohio. The trip was made under the personal supervision of Congressman Charles Brand, former state senator, who two years ago led a fight for gravel roads in Ohio. To the gratification of sand and gravel men of Ohio, it is said that the inspection trip will give impetus to the gravel road program in Ohio. Under the administration of former Highway Director Leon C. Herrick no gravel roads were built in Ohio. Governor Donahey has always been a booster for gravel roads, and the result of his inspection, it is definitely believed, is a forerunner of a program of gravel road building in the state in 1924. The governor is of the opinion that a heavy lay of gravel is not only durable, but in addition serves as a foundation for a hard surface road, if the State should choose later to build one. The latter part of the month a contract was let for a gravel road from Columbus to Kentucky, the longest stretch of road ever built at one time with gravel under State aid. The cost will not exceed \$7,000 a mile, and the Governor and his advisors are most enthusiastic at the financial savings involved.

Market conditions for practically all materials have improved over the draggy period of last month. Although building operations total no larger than construction of the past two months, an increased demand for all basic materials comes from the residential construction source. Inasmuch as a number of the larger building jobs have been completed the last few weeks, there has been left a sufficient supply of skilled labor for the smaller contractors who previously could not compete with the wages offered by the large contractors, and who are now busily engaged in innumerable subdivision residence building. This subdivision construction has

brought a two-fold demand for materials, as street construction in the subdivisions is essential, offering the second call for sand, gravel and cement.

Prices on all materials remain firm. Washed gravel sells at \$1.50 a ton, f.o.b. cars, sand, \$1.20 f.o.b. cars, cement \$2.99 a barrel, f.o.b. cars; and lime is quoted at the market price of \$16.80 a ton. The demand for cement has been unusually large, and possibly this material is shortest in the local market. The McCammon Brothers Co. report that a number of the cement mills are behind on their shipments, and the increased demand has caused supplies to appear almost short at times.

Cooler weather of the past few weeks, conducive to intensified building work has created the calls for shipping directions on contracts on the books of the Ohio River Sand and Gravel Company, according to officials of that company. River diggings have been going on at a steady pace. Some repairs have been made on floating equipment of the river operations, and distribution is steady in river sand to local sand and gravel jobbers.

The Marion M. Allen Supply Company is celebrating its thirtieth year in business this month. Through a business policy, based on fundamental principles, this concern has grown to one of the largest in this section, and enjoys the confidence of the building contractors. The most modern equipment is employed. At the company's plant all materials are handled through hoppers and loaded in a fleet of Pierce-Arrow truck equipment. H. W. Abbott, manager of the Marion M. Allen Supply Company predicts a most encouraging Fall business for the entire industry in this section.

The Hercules Sand Company, of Gallipolis, Ohio, has been incorporated for \$25,000. Incorporators are Karl F. Bierich, Joe Moch, Harriet Bierich, J. L. Rinehart and G. W. Beeson.

The Alpena, Michigan, plant of the Huron Portland Cement Company which suffered a serious fire recently is expected to be running at full production again in at least a month.

The Portland Cement Company, Boise, Idaho, is planning on a mammoth cement plant at Port Neuf station, a short distance from Pocatello.

## Texas Markets Improve

### Fall Building Activity Expected To Help Greatly

(By Our Dallas Correspondent)

Dealers in sand and gravel in Texas report an improving market for their products as the Fall building rush begins and as road construction and street paving takes on new impetus, with the approach of cooler weather. The period of summer dullness in the building trades seems about at an end and building operations all over the state are taking on new life.

In Dallas, the Athletic Club Building is under construction and work has advanced to a point where concrete is being poured. This building will require a large quantity of sand and gravel, which is being furnished under contract.

The City of Dallas is also carrying forward an extensive street paving program, and is using large quantities of sand and gravel for concrete base, which is being put down as a base for all pavement laid in the city.

Dallas County is not yet finished with the highway construction program begun when the tax-payers voted \$6,500,000 in bonds for highways in the county. Most of the work has been completed on the four cardinal highways crossing the county, and construction is well advanced on the belt line, a highway just inside the county line, which entirely encircles the city and joins all the cardinal highways. The cardinal highways are of concrete construction, but the belt line is being built of gravel. Practically all the gravel dealers in the city are furnishing gravel for the belt line, and the county is taking gravel for its own pits.

The Grand Prairie Gravel Company, which operates extensive pits on the Trinity River, near Grand Prairie, ten miles west of Dallas, reports that it is now working to full capacity and is shipping about 300 carloads of gravel a day. This company owns its own spur track from the main line of the Texas & Pacific Railway Company, to its gravel pits, and operates its own locomotive and gravel cars. Two large steam shovels and two drag lines are used in loading gravel. Much of the gravel shipped out is for road construction and railway ballast.

Clay County is preparing to begin work on its highway construction program, which calls for an 18-foot concrete highway entirely across the county from Southeast to Northwest, along the route of the Gulf-Colorado Highway, and also northward from Henrietta, the county seat, to the north county line at Red River, along the route of the Meridian Highway. A bond issue of \$4,500,000 has been voted and the record approved. Negotiations are now under way for the sale of the bonds and work will begin as soon as contracts can be awarded.

Considerable construction work is under way along the Gulf-Colorado Highway. Wise County is building 15 miles of crushed stone and gravel road in the western part of the county and Wilbarger County is building about 15 miles of concrete highway, beginning about 10 miles east of Vernon and extending 5 miles west to the Pease River Bridge.

The Commissioners' Court of Coleman has awarded a contract to J. H. Buchanan of Temple, Texas, for the construction of 6.8 miles of Highway No. 7, in Coleman County, for \$41,887. The highway will be of gravel surface.

The City of Cisco, Texas, announces that work on the dam which will form Lake Cisco, built at a cost of more than \$1,000,000, will be completed by Sept. 1. This dam will form a lake about 7 miles long and impounding 8,000,000,000 gallons of water. More than 45,000 cubic yards of concrete was used in constructing the dam, with 1,000 tons of reinforcing steel.

County Commissioners' Courts of Fannin County, Texas, have begun quarrying rock from the Y. B. Reed Farm for construction of a highway from Trenton to the Grayson County line.

The City Commissioners of Fort Worth, Texas, have awarded three paving contracts as follows: To the West Texas Construction Company, paving Evans Avenue from Milkey Street to Capps Street, and for paving New York Avenue from Ramsey to Capps Street; to General Construction Company, for paving West Oleander Street.

An election for voting \$4,750,000 in bonds, the proceeds of which will be used in building concrete highways in the county, has been ordered by the County Commissioners of Navarro County, sitting at Corsicana, Texas.



## Cement Holds Its Own

### Most Mills Have Capacity Sold For Some Weeks Ahead

(By Our Special Correspondent)

Cement production in the Lehigh Valley section of Pennsylvania has not responded to the intimation of decreased building operations up to the present time and continues under close to maximum output. The majority of the mills have orders on hand to insure manufacture for some weeks to come and consequently are not giving any immediate concern to immediate predictions, founded on fact or theory, as the case may be.

Operations at the mills during July showed about a 25 per cent increase over the June figures and this advance is being duplicated in August. With curtailment at different blast furnaces and steel plants in this section, there is a noticeable improvement in the labor situation at the cement mills, speaking from the viewpoint of supply, and common labor, as well as skilled help, is now available. A few of the mills have added to their working forces and made desirable changes for greater efficiency.

Up to the present time, the demand for cement from the eastern sections as well as in the west, exceeds the shipment of material. With June providing a brief period in which reserves might be replenished, the past four to six weeks shows no such opportunity, in fact some of the mills have necessarily drawn on their stocks to hold to customers' requirements. The call for road-building operations holds up well and this condition is expected to obtain for a number of weeks to come. Large quantities of material are being absorbed by the state and county highway departments in Pennsylvania, New Jersey and New York.

The railroads are co-operating with the mills in furnishing cars, and there has been a noticeable improvement in this direction in recent weeks. At the same time, there is no change in the situation as regards other means of transportation and fleets of motor trucks are still being pressed into service for distribution of material to nearby points. The gradual improvement in this latter means of delivery and the general satisfaction derived, leads to the opinion of many mill men

that the future will see more and more motor trucks hauling from the plants.

The Lehigh Portland Cement Co., Allentown, Pa., continues active in its different plants, including the mills at West Coplay, Ormrod and Fogelsville. The company is said to have booked heavy advance business and it is likely that present production will be maintained for an indefinite period, with curtailment only brought about by necessary repairs and improvements in operating machinery. The new southern mill of the company at Birmingham, Ala., now in course of building, is expected to assist materially in the line of production, and will be placed in service at the earliest possible date. The employees of the company have held their annual outing, the sixteenth such event, and as usual, it proved a gala affair. It was carried out at Neff's Park, near Allentown, and about 300 office employees participated in the sports and games, terminating with a delicious clambake.

The Pennsylvania Cement Co., is operating under heavy output at its plant at Bath, Pa., and expects to continue on this basis for some time to come. Orders for material, it is stated, are heavy, with immediate distribution a feature of the situation. The company has been busy installing additional equipment at the local mills to provide for general increase and greater efficiency in operation in a number of departments.

The Phoenix Portland Cement Co., Nazareth, Pa., is maintaining its regular output under satisfactory operations and will keep up the present activity until there should be a decided change in conditions. Sizable shipments are leaving the plant daily, and the call for material from building and road contractors, and supply dealers is reported as good. As a result of a statement given quite wide publicity, that the company was involved financially as one of the subsidiaries of the R. L. Dollings Co. of Ohio, now in bankruptcy, an emphatic denial has been issued from the executive offices. In this it is set forth that the company is in no way connected with or affected by the litigation against the Dollings interests; that it is a corporation organized under Pennsylvania laws, for many years past operating a mill at Nazareth, and lately, another plant at Birmingham, Ala. In explanation of the alleged affiliation, the company says:

"Within the past year, the Dollings interests organized a corporation under the laws of Ohio, named the 'Phoenix Portland Cement Co.' and that company endeavored to acquire control of our capital stock, but the negotiations were abandoned, and as a result neither the 'Phoenix Portland Cement Co.,' the Ohio corporation, nor the R. L. Dollings Co., nor any corporation controlled by them or in which they are interested owns any stock or bonds of our company, or in any way controls its affairs, nor does our company own or control any securities of any of the Dollings companies or any of their subsidiaries."

At a recent meeting of the stockholders of the Nazareth company, held at Nazareth, the following officers were elected for the ensuing year: Lindley C. Mortor, president; J. L. Walker, first vice-president; C. L. McKenzie, second vice-president; E. P. Haubert, secretary and assistant treasurer; and A. W. Nash, Jr., treasurer.

The Universal Portland Cement Co., is holding to maximum operations at its Universal, Pa., plant, and of recent date, record shipments have been leaving the works. There is every indication of maintenance of present activities for some time to come, and a large working force is being employed. The company has recently commenced the installation of a new dust precipitation collection system at its Buffington, Ind., mill, and expects to have this feature ready for complete service at an early date. It will represent an investment of close to \$500,000, and will also abate noxious gases and coal dust at the plant. The new system is expected to bring about material improvement in elimination of cement dust which has troubled residents of East Chicago and Indiana Harbor.

The Kansas Portland Cement Co., Federal Reserve Bank Building, Kansas City, Mo., is making ready to commence work at its proposed new mill at Bonner Springs, Kan., for which plans recently have been completed. The plant will consist of a number of units, with power house, machine shop and other mechanical buildings, and is estimated to cost close to \$1,000,000, with machinery. It will be built under a day labor plan, and is expected to be ready for service in the spring.

The Southeastern Portland Cement Co., Macon, Ga., recently organized

with a capital of \$3,000,000, has opened offices in the Dempsey Hotel, Macon, and will direct the construction of its proposed new mill, including equipment purchases, etc., from this point. The company will soon break ground for the first units of the new mill to be located on a tract of land, totaling about 600 acres, at Ainslie, approximately 27 miles south of Macon. The plant is estimated to cost close to \$2,000,000, and arrangements have been consummated to provide a fund of this amount for the project. It will be equipped for a daily output of 3,000 barrels. The company will also operate extensive limestone properties in the vicinity of the new plant for raw material supply, installing complete quarrying, crushing and pulverizing works for this purpose. Test borings indicate a deposit of about 50,500,000 tons of limestone, and 13,000,000 tons of clay, or an amount sufficient for 200 years under the initial rated capacity of the plant. W. Jordan Massee is president of the company; G. P. Dieckman is vice president and general manager, and will be in active charge of operations. J. E. Satterfield is secretary and treasurer.

The Southland Portland Cement Co., Nashville, Tenn., recently formed with a capital of \$1,000,000, is arranging for the erection of a new plant at Crab Orchard, Tenn., where a large tract of land has been secured. The initial mill will have a rated output of about 8,000 barrels per month, and will include a large power plant for operating service, as well as other mechanical buildings. Limestone properties will also be developed and operated in this same section for raw material at the plant, with fully equipped quarry and crushing department. The initial works will cost close to \$600,000, and it is expected to have a number of the buildings ready for service early in the coming year. The new company is headed by J. C. Parker, L. H. Wright, Indianapolis, Ind.; and B. L. Ireland, Nashville.

The Pyramid Portland Cement Co., Des Moines, Ia., has been formed under Delaware laws with capital of \$100,000, to operate a local cement mill. The new company is headed by A. C. Pearsall, F. H. Mackmal and A. O. Hauge, all of Des Moines. It is represented by the Corporation Service Co., Equitable Building, Wilmington, Del.



# New York Slowing Down

## Declines in Construction Work Furnish Reason

(By Our Eastern Correspondent)

The decline in construction operations at New York and other eastern points is tending towards a corresponding slowing down of orders for sand, gravel, crushed stone and kindred products. The call for immediate business continues good, but advance bookings are not so encouraging. Unless there is a decided change in the situation, materially reduced operations will prevail during the fall and winter.

Sand and gravel producers in the Long Island districts, as well as in New Jersey, are making the best of the favorable weather and quite heavy production in current. The building supply dealers are maintaining stocks at a fair point, although the uncertainty in the outlook is leading many dealers to permit their reserves to fall below the regular quota. It is this lack of orders that the producers are commencing to feel, but which has its bright aspect in permitting stocking up at the different plants, a phase of operation heretofore necessarily neglected, due to rush of business.

Road construction operations continue at a good status and practically all of the rock-crushing plants in this section are running full. Large shipments are being made for immediate service and this branch of the industry bids fair to prosper for a number of weeks to come.

The labor situation shows no marked improvement, save for the fact that men from one plant, either in a similar line, or otherwise, are migrating to other works where the wage scale may be a little higher, and this is allowing some yards to fill their quotas. At the same time, this bidding for labor is not the most desirable thing for business stability and is sure to have bad effects.

Prices continue firm in the New York market, with the exception of best grade washed gravel, which has declined 50 cents a cubic yard in the wholesale market during the past fortnight. The figure now stands at \$1.75 for 1½-inch and ¾-inch material, or at the same level as at this time a year ago, compared with quotations of \$2.25 through the month of July, and

for some weeks previous, in cargo lots. Building supply dealers are asking \$3.50 for washed gravel, delivered on the job in New York, Queens and Bronx boroughs.

Washed sand holds at \$1.25 a cubic yard in carload lots, an advance of 25 cents over the figure at this time a year ago, but giving a proportionately lower margin to the producer owing to the increase in cost of labor. This figure is firm, and there is no indication of any early decline. Retailers are quoting \$2.50 a cubic yard for the material delivered on the job. Fine white sand is selling for \$5.00 a cubic yard in the retail market.

In the wholesale market, crushed stone holds at \$1.65 a cubic yard for 1½-inch stock, while ¾-inch material is bringing \$1.75. These quotations correspond to those prevailing just a year ago, and are being quite rigidly maintained by wholesalers. Dealers are selling broken stone at \$3.25 a cubic yard in Manhattan and Bronx borough. In nearby markets, there is an equally good call for stocks, at figures of \$1.70 to \$1.90 a cubic yard wholesale, in cargo shipments.

Portland cement is enjoying a fine turn-over and is one of the few basic construction commodities which has not, as yet, been subjected to a decrease volume of orders. Wholesale, contractors and dealers at New York are paying \$2.30 alongside dock, while delivered by motor truck, manufacturers are asking \$2.70 and \$2.80 per barrel. Retail, dealers price the material at \$3.20 a barrel, less the now-standard bag rebate of 10 cents each. Despite the fact that the mills continue to run full, there is no great reserve of cement at the warehouses or at the supply dealers' yards, and with a continuance of the current demand, it is likely that production will show a deficiency as the fall months mature. Portland cement is also held as a good trade barometer and in the present aspects, the situation holds encouragement.

The Quality Sand & Gravel Co., Springville, N. Y., recently organized, is perfecting plans for the operation of gravel properties on the Manley King farm on Waverly Street, recently acquired. The pit has been in service previously, but only on a small scale, and the new owner plans for the installation of modern equipment for large increased output. Stephen Engle is president; William Tietz, vice-presi-

dent; and James P. Healey, secretary and treasurer.

The Bronx River Sand & Gravel Corporation, New York, has been organized to operate sand and gravel properties in the Bronx district. The company is capitalized at \$125,000, and plans to commence operations at an early date on a large scale. The new organization is headed by W. B. Waldo, and A. J. Stone. It is represented by Breed, Abbott & Morgan, 32 Liberty Street, New York.

The Seaboard Sand & Gravel Corporation, Port Jefferson, L. I., is perfecting plans for heavy production at its local properties, comprising approximately 800 acres of land. Considerable new machinery has been installed and additional equipment is still to be placed, representing an investment of close to \$250,000. The company has recently arranged for a mortgage loan of \$200,000 on its plant, utilizing the fund in connection with its expansion plans. It is expected to remove more than 55,000,000 cubic yards of high grade sand and gravel from the Port Jefferson lands, and the work will be handled, in accordance with company arrangements, in a way to permit the land to be left at a uniform grade above the sea level. George W. Loft and W. Butler Duncan head of the company.

The Hygrade Sand & Gravel Co., Mineola, L. I., has recently been chartered under state laws, to join the list of producing companies in the Cow Bay and other Long Island districts. The new organization will operate with a capital of \$25,000, and plans for extensive production. It is headed by J. A. Hinnes, T. F. Lynch and A. A. Manning; and is represented by Barnes, Chilvers & Halstead, 2 Rector Street, New York.

The Seymour Sand & Stone Co., Seymour, Conn., is maintaining active production at its plant, and large distribution has been going forward to nearby points for important operations. The company has recently made a number of improvements at its plant, including the installation of a new stone crusher, power drag, scraper, screen bins and other apparatus, to provide not only for greater production but for increased efficiency in operation.

Matthew G. Maloney, George Seivwright, Henry C. Emmons, and associates, Montpelier, Vt., heretofore operating local granite properties under a partnership arrangement, have

recently formed the Eureka Granite Co., Inc. of Montpelier, with a capital of \$50,000, and will run under this name in the future. The new corporation will also provide for proposed expansion in operations.

Ward-Brown-Ducey, Inc., Haverstraw, N. Y., recently organized, will operate local gravel properties and plan for extensive production, providing complete operating equipment for this purpose. The new company is headed by J. J. Brown, W. Ward, and J. Ducey, all of Haverstraw. T. Gagan Haverstraw, represents the company.

The Bound Brook Crushed Stone Co., Bound Brook, N. J., has preliminary plans in progress for the rebuilding of its plant in the Chimney Rock Ravine section, Watchung Mountain, recently destroyed by fire, with loss estimated at close to \$200,000. A large quantity of modern stone-crushing machinery was demolished, including power equipment and auxiliary mechanical apparatus. It is expected to replace this loss with new equipment at the rebuilt plant.

Stone quarries in the vicinity of Lambertville, N. J., and other points in Hunterdon County, are running full with good orders on hand, the majority of output to be utilized in connection with county road-building work now going forward throughout this section. In a number of cases labor is hard to secure, and plant are finding it difficult to maintain desired production.

The Grove City Limestone Co., Grove City, Pa., is operating under maximum output and record shipments are leaving the plant, the bulk of material moving to Western Pennsylvania for use in road construction here. The month of June showed a gross shipment of 290 cars, or a tonnage output estimated at 14,500 tons; July evidenced a still greater production with August a close second. The official figures for the last two months will be available at an early date. With the exception of a small working force used for flux stone for shipments to blast furnaces, all men at the plant are being employed for quarrying operations, and preparing for shipment.

The Greenlawn Gravel Company, Columbus, Ohio; capital \$50,000; Herbert H. Gill, Harry Leyton, C. O. Rhoades, George Murphy and L. J. Paulson.



## Mead-Morrison Type "W" Bucket

The Mead-Morrison Company of Boston, Mass., claim for their type "W" clamshell bucket some exceptional performances around dredging operations. The bucket was designed for operating



in hard packed material and was arranged to employ greater closing power than is ordinarily considered necessary in buckets of this kind. The illustration above shows one of the buckets in operation on a dredging job at Everett, Mass. where it was necessary to dig in hard packed blue clay. The bucket which is rated at  $1\frac{1}{2}$  yard capacity is said to have often scooped up 2 yards at a time and to have emptied quickly.

Further information on equipment manufactured by this concern may be had by addressing Mead-Morrison Company, Boston, Mass.

The John Evans Lime & Stone company plant, northwest of Marion, Ohio, suffered a fire loss which is estimated at between \$20,000 and \$25,000.

## New Powder Manufacturers

A new name has appeared in the list of producers of explosives and operators in the pit and quarry field will undoubtedly soon be approached by representatives of the new company.

The Peerless Explosives Company began business last June at Wilkes-barre, Pa., manufacturing a complete line of high explosives which they are prepared to distribute in any territory east of the Mississippi River from Maine to Florida. A branch office has already been opened at Pittsburgh under the direction of Mr. C. S. Simonsen and a representative has been appointed at Huntington, W. Va. In addition, other territories are being covered at the present time by representatives of the concern.

The personnel of the new organization includes men who have had many years of experience in the manufacture of explosives. The plant is said to be modern in every respect and equipped throughout with up-to-date machinery that can be made to produce in excess of 100,000,000 pounds of high explosives per month. The plant is located at White Haven, Pa., on the Central of New Jersey and the Lehigh Valley Railroads.

The officers of the company are Edward R. Day, president, Raymond I. Bashford, vice-president in charge of operations, Eugene Frost, vice-president and treasurer, and Harry K. Gregory, secretary.

The management states that so far their product has met with a good reception and that they have quite satisfactory reports from those who have used it.

H. L. McCourtie, president of the Trinity Portland Cement Company of Dallas, has announced the purchase of 602 acres of land north of Fort Worth on which a 2,500-barrel capacity cement plant will be erected. It is expected that the plant will be completed within a year.

The Santa Cruz Portland Cement Company of Davenport who are now operating 14 kilns, is preparing to put 4 more in operation as soon as they are equipped. They have purchased 60 acres more of limestone rock which is part of the Rancho Arroyo De la Laguna near Bonny Doon, Calif. The transaction involves an investment of \$25,000.

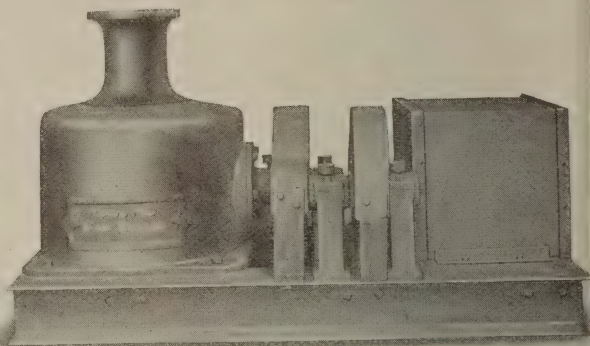
## Compact Car Puller

The Mining Machine Company of Mountville, Pa., manufacture a car puller that should fit in well around many of the operations in the pit and quarry field. Pullers are furnished with totally enclosed motor drives or may be had for belt drive. The puller applies power to the haulage rope through a vertical capstan which makes it possible to effect a haul from any angle. Power is transmitted from the motor to the capstan through a spur and a bevel gear drive totally enclosed in cast iron housings to conform to safety regulations. Where motors are used, sheet metal covers are installed over the motor drive to prevent the entrance of any foreign matter.

The question of bearings has been very carefully worked out and the manufacturers claim that their arrangement brings about perfect gear alignment with elimination of thrust strains and gives proper support for

all parts when operating at maximum load. The manufacturers claim, too, that their machine embodying compact and rugged construction will handle a heavy haul at a very low speed.

An interesting folder issued by the



company carries complete information on the puller giving full specifications, illustrations of various types of pullers used, showing the pullers in operation at a number of plants and including a list of the companies which have recently installed this equipment.

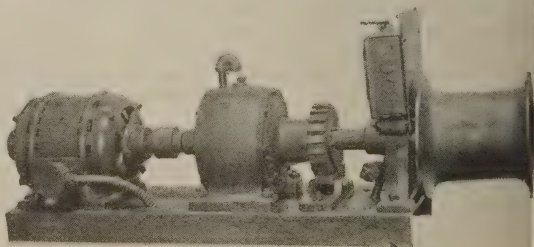
Copies of the folder may be had by addressing the Mining Machine Company at Mountville, Pa.

## Portable Car Puller

Louis Falzer & Company announces the manufacture of a new portable car puller. The device is operated by a two horsepower specially designed motor, driving through a speed transformer. To the shaft from the transformer, is fixed a caisson winch head (nigger head). All the elements of the device are held rigidly in line and protected against reverse motion by a protective safety device and maintained on a strong base which may be fitted with skids or wheels at the customer's option. This piece of equipment is also suitable for general utility work around operations in the pit and quarry field. It may be made to serve as a trench and caisson hoist and in other

places where a small hoist can be employed.

Kerr Portland Cement Company, Moundsville, W. Va., had incorporated cement and road building materials, \$2,000,000 preferred and 15,000 shares without par value. James E. Brandon, Jr., John A. Brandon, Ronald B. Jester, New Cumberland, W. Va.; A. H. Kerr and T. P. Weaver, Burgettstown, Pa.

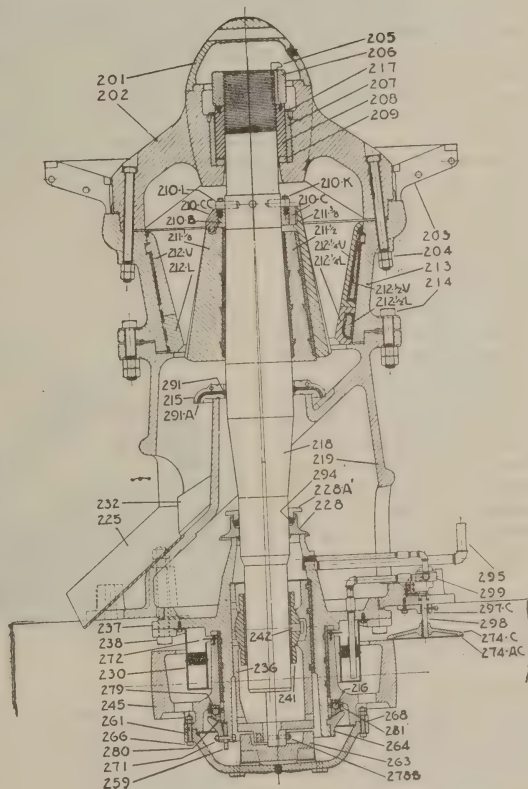




# KENNEDY BALL BEARING GEARLESS CRUSHERS

## WHY THEY LEAD

- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.



Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

**KENNEDY VAN SAUN MFG. & ENGR. CORP.**

50 Church St.

NEW YORK

CIE. DES. ENTREPRISES INDUSTRIELLES, PARIS

## New Gasoline Dipper Shovel

A gasoline driven power shovel operated entirely with gears and shafts, is the latest improvement in this type of machinery, announced by the Orton & Steinbrenner Co., manufacturers of cranes, shovels, and buckets, of 608 So. Dearborn St., Chicago, with factory at Huntington, Ind.

The steam driven type of shovel has long been in use and has proved very successful. During the past few years, on account of the development of the gasoline motor, various schemes have been put forward, attempting to adapt this form of power to a dipper shovel. The principal difficulty was that it became necessary to provide an arrangement to take the place of the independent source of power for the reversible crowding motion of the dipper stick. With the steam operated type, this is accomplished by means of a small steam engine geared directly to the shipper shaft. But with the gasoline or electric type, this method was not feasible, and other means had to be developed. Until now, no device was hit upon that was as dependable and trouble free as the steam engine geared type.

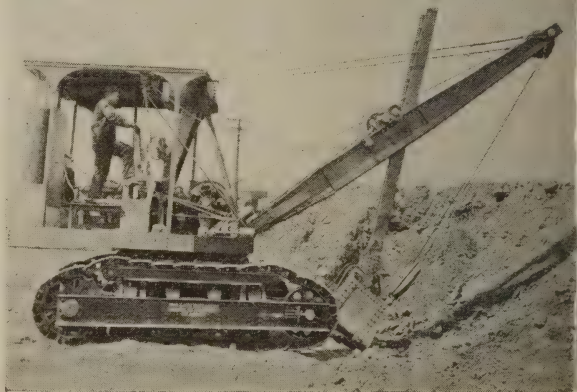
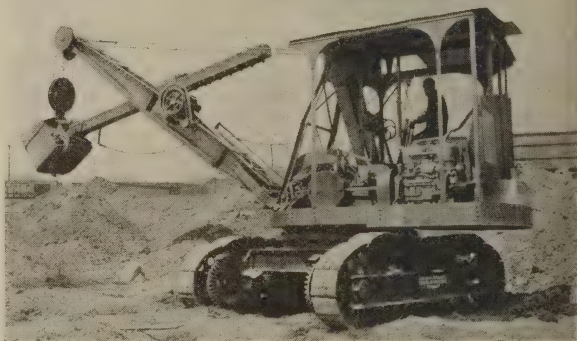
The positive gear drive on the O. S. Dependable is simple and the number of parts few. At the bottom of the boom connection is a shaft carrying double steel bevel gears and bronze friction clutches. This shaft is concentric with the pivot of the boom and consequently being independent of its position. The boom can be used at any angle to suit the exigencies of the work. A practical shovelman can readily see the great advantage of this arrangement.

Along the boom is a steel shaft carrying two bevel pinions, one meshing at the bottom with the gears on a

the horizontal shaft, and the other at the top meshing with gears on a countershaft located about half way up the boom. This latter shaft carries a brake and "slip friction," and is geared directly to the cast steel rack on the dipper stick.

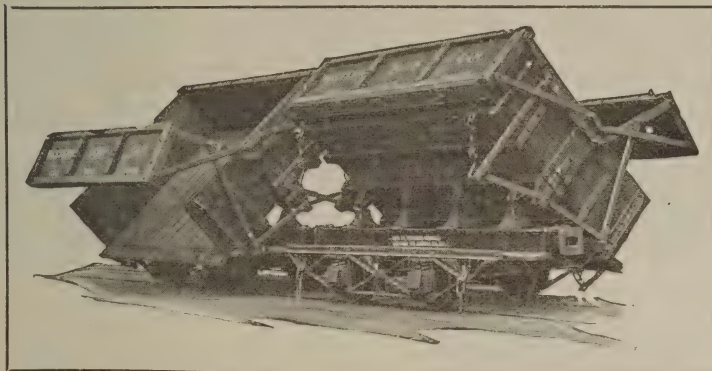
With this method, a minimum number of levers are required, the operator being at ease all the time and not subject to the fatigue incidental to operating the rope driven type.

The hoisting mechanism is rugged and simple in construction, in fact it is the same as in the locomotive cranes built by the Orton & Steinbrenner Co. for fifteen years. The simplicity of parts is also of great advantage in converting the shovel into a clam shell outfit, drag line, or skimmer rig.





# Performance Tells the Story



You cannot judge a dump car by looking at the drawings. Some other makes of cars may look equal to the **Western**—on paper. It is the performance that counts. There are strains and stresses in quarry work which cannot be anticipated. Forty years of field tests have taught us how to overcome them.

We recently sold a large order of dump cars to a company which had virtually decided in favor of a competing car;—they liked the blue prints better. They were persuaded to investigate the **performance** of the two cars under working conditions and Western cars were promptly selected.

**Western**

*That's why*

Western dump cars will **OUTWORK** and **OUTWEAR** other makes of dump cars. Made in all sizes to suit the work, but the 6-yard standard gauge car is the favorite with pits and quarries. Send for specifications. The cars will pay for themselves.

## Western Wheeled Scraper Company

Earth and Stone Handling Machinery

AURORA, ILLINOIS

The power is supplied by a heavy duty 4-cylinder "Climax" motor, which is designed with a view of economical use of gasoline, and the consequence is that the cost of operating is extremely moderate.

Another exclusive feature of the machine is the flexible crawling tread. Full advantage has been taken of the experience gained in the design of tanks used in the World War, which experience showed that flexibility and lubrication of the tread and tread rollers was absolutely necessary to their proper operation. During the last few years developments have occurred and experiments have been made that prove the absolute soundness of this type of construction.

These flexible treads adjust themselves readily to the ground surface, equalizing the weight of the machine and distributing it over a considerable length of tread, instead of concentrating it on one roller or tread casting.

Alemite fittings are used exclusively in lubrication. These provide the quickest and most effective means yet devised for getting the grease into the bearings.

Steering is accomplished by one man in the cab. The drive is by means of steel shafting and bevel gears throughout. Positive power is secured always. The main gears are large size, slow moving and shrouded.

On the main horizontal drive shaft are two brake wheels by means of which each tread may be operated independently or both may act together. The mechanical differential arrangement is exactly similar to that used on automobiles.

When used as a crane, the only thing required is to take off the shovel boom and attach the crane boom; the crowding frictions for operating the dipper is carried by the shovel boom and an integral part of it are removed with it. The shovel, when furnished with double drums can be used interchangeably with the crane. This feature alone saves the cost of a new machine. With the crane boom attached, any of the various types of buckets or scoops can be used, such as clam shell, drag line, skimmer scoop, or trench hoe; pile driver leads may be swung from the tip of the boom.

Full information on this versatile machine may be obtained by addressing the Orton & Steinbrenner Co., at 608 So. Dearborn St., Chicago.

## Yosemite Portland Cement Co.

A site, consisting of 145 acres, one mile northeast of Merced, was purchased on August 8 by the Yosemite Portland Cement company for its cement plant which will represent an investment of \$1,500,000 when it is completed, it was announced by C. S. Woody of San Francisco, vice president and treasurer of the new San Joaquin valley industry.

The plant site lies at the junction of the Southern Pacific railroad and the Yosemite Valley railroad and one mile from the Santa Fe railroad. The Santa Fe railroad will immediately construct a branch line to the site.

The location of the plant was regarded as exceedingly fortunate by Mr. Woody, who declared that because of the direct connection with the railroads, all truck hauling could be dispensed with. The new cement plant also will be the only one on the Santa Fe railroad north of the Techachapi, it was pointed out.

The Yosemite railroad runs directly through the limestone deposits at Jenkins hills, which the company will utilize so that not even a branch track will be required, Mr. Woody said. Necessary switching tracks already have been constructed.

Another site advantage cited by Mr. Woody is that the high tension lines of the San Joaquin Light & Power corporation run directly over the quarry as well as the Merced plant location.

While the company had options on several possible sites near Merced, final action in the selection of the site was delayed until the arrival of Col. Leigh Hunt of Kansas City, one of the nation's authorities on cement manufacture, who will personally direct the construction of the plant and will operate the mill during the first month after completion.

The Southland Portland Cement Company have filed charter for the operation of a cement plant at Crab Orchard, Cumberland County and will have their headquarters in Nashville, Tenn. The company is incorporated for \$1,500,000, with James C. Parker, Louis H. Wright, Ben. Ireland, John R. Aust and Oscar Mather, incorporators. According to Mr. Parker, it will require a year to construct the plant.

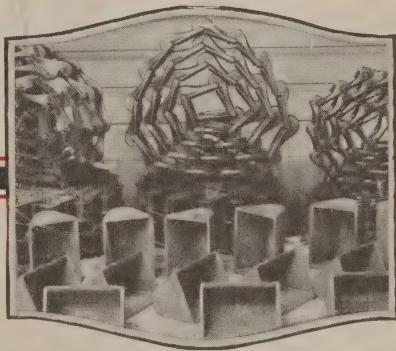
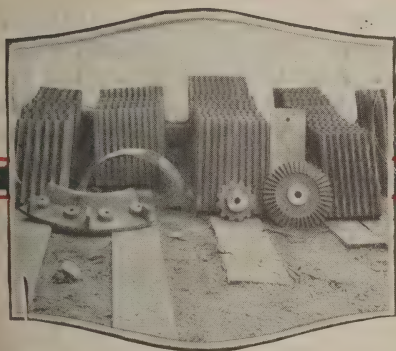


# Pit and Quarry

SAND ■ GRAVEL ■ STONE

HANDLING ■ CRUSHING ■ SCREENING ■ WASHING

STATE GEOLOGICAL SURVEY



## Get Your Money's Worth

You will, if you get M & M Manganese steel parts and chain, as well as Buckets in Plate Steel, Malleable Iron and Manganese Steel.

M & M Manganese steel carries the Moore & Moore guarantee of quality, backed by years of experience and is offered to you at prices based upon cost.

In your next replacements order M & M Manganese steel parts.

**MOORE & MOORE, INC.**

READING, PENNA.

September, 1923

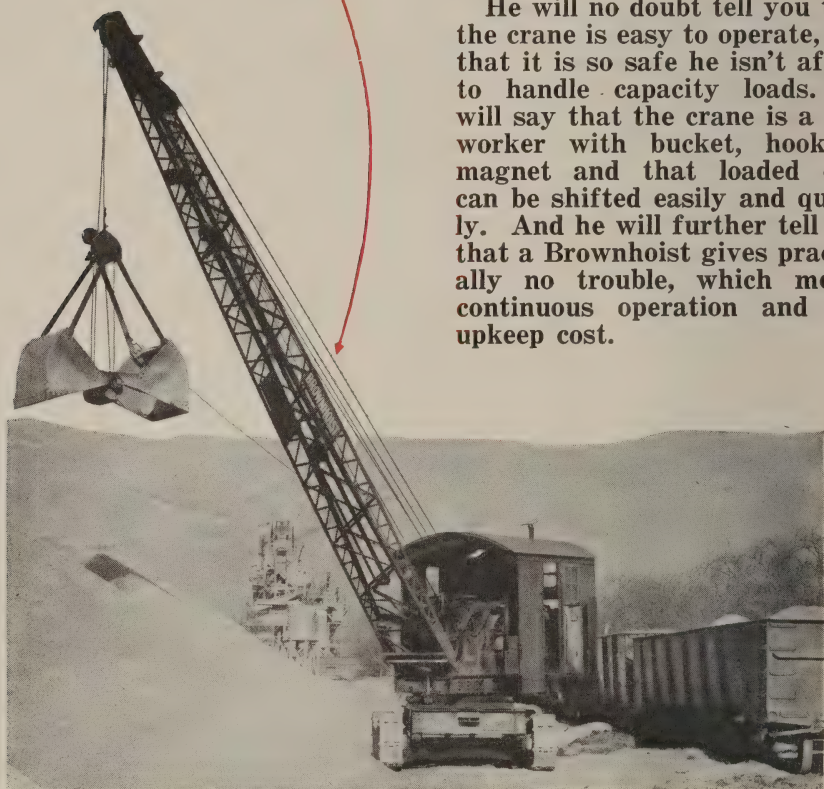
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Circulation 7,400 copies

## Whenever You See a Creeper Crane Look for

Ask any Brownhoist operator what he thinks of his crane. Inquire of him as to the crane's operation, capacities, speeds, engine, traveling mechanism, clutches and in fact every detail.

He will no doubt tell you that the crane is easy to operate, and that it is so safe he isn't afraid to handle capacity loads. He will say that the crane is a fast worker with bucket, hook or magnet and that loaded cars can be shifted easily and quickly. And he will further tell you that a Brownhoist gives practically no trouble, which means continuous operation and low upkeep cost.



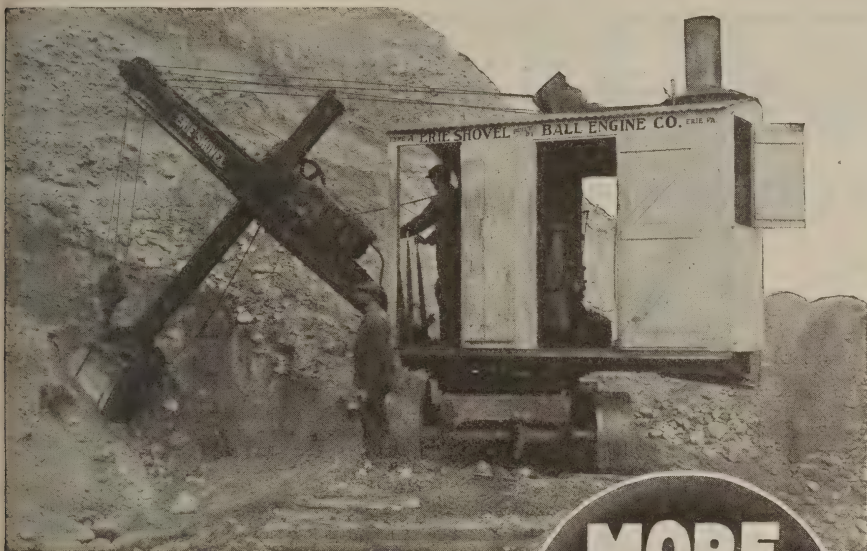
**The Brown Hoisting Machinery Co., Cleveland, O.**

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*Locomotive Cranes, Buckets, Heavy Dock Machinery, Bridge Cranes, Belt and Chain  
 Conveyors, Bunkers*

# BROWNHIST

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Even the smallest ERIE (shown above) often gives an output of 500 tons a day, or even more under favorable conditions.

This is a 13-ton "A" ERIE owned by P. Cogger, Crushed Stone & Gravel, Lowell, Mass. He writes:

*"I would not have believed that we could do the work that this 'A' ERIE actually handles. It has given 50% more than I had expected.*

*"Besides, we have dug sand and rock that was frozen three ft. deep, without a single thing going wrong with the machine."*—P. Cogger.

Whether you need an output of 200 tons a day or 1,000 tons, or more—you will be interested in a bulletin that shows just what ERIE Shovels and Cranes can do for you. Write for Bulletin Q-3016.

**MORE  
GRAVEL;  
less cost**



Every ERIE Shovel is quickly and easily convertible into a locomotive crane for handling clam-shell buckets.

**ERIE STEAM SHOVEL CO. Erie Pa., U. S. A.**

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Builders of ERIE Steam Shovels, Locomotive Cranes.

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## The Superintendent—The Drill Runner

There is a big difference between the point of view of the Superintendent and the Drill Runner. The one wants results—the other wants a drill that gives him no trouble and is easy to run. The Cleveland No. Forty-Four satisfies both. The Superintendent is satisfied because the Cleveland is practically unbreakable, being built throughout of forgings made in our own plant. The Drill Runner likes it because it has no kick back and less vibration than any other drill built today. The result—it is easy to run and Mr. Drill Runner produces a good day's work. Write us about our trial offer.

The No. Forty-Four for air. The A-1 for steam

**The Cleveland Rock Drill Co.**

**3744 E. 78th St.**

**Cleveland, Ohio**





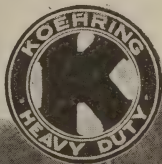
# KOEHRING

## Crane-Excavator

- 1** In restricted quarters, no need to travel the crane back and forth. Just boom loaded bucket. This is a regular operating action with the Koehring and puts no strain or abnormal wear on any part.
- 2** No interlocking sets of gears — *no* clutches with double functions.
- 3** All operating functions independent — hoisting, peaking, sluing, rotating and propelling may be operated independently or in any desired combinations.
- 4** Two line speeds. No change of gearing or drums to change from drag line to grab bucket—just change buckets, and shift a clutch.
- 5** Quick change to power shovel, by change of boom, addition of dipper handle, and shovel, cable and drive parts.

Write for  
Koehring Crane Bulletin No. 3

**KOEHRING COMPANY**  
MILWAUKEE WISCONSIN



# have you seen this NEW BUCYRUS?

A  $\frac{3}{4}$ -yard Gasoline or Electric Shovel you won't be afraid to put in the toughest digging.

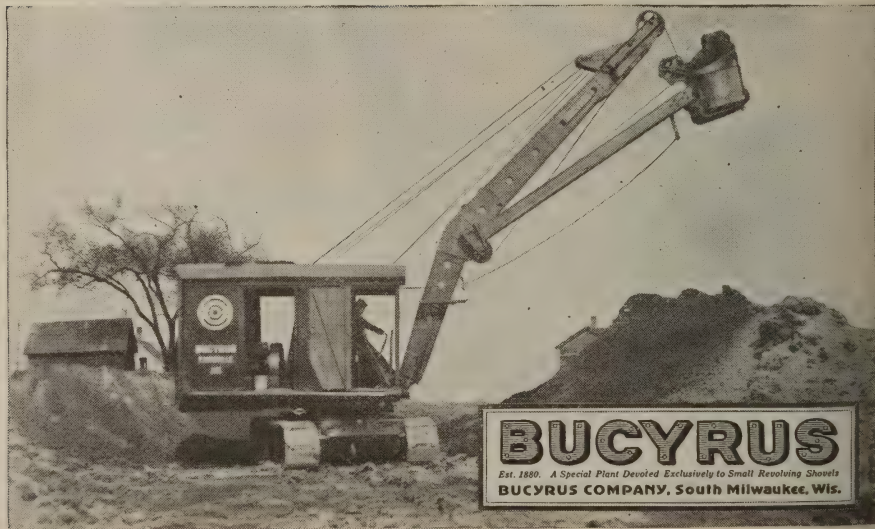
Look at that Boom! Note that there is no machinery, no chains and no complicated shafting.

A patented rope drive with all the force of the powerful slow-speed main motor back of it.

Far simpler in design and easier to maintain than previous Gasoline or Electric Shovels of this size.

May be had with High-Lift Boom, or as a Dragline Excavator, Clamshell Excavator or Crane.

Send for Bulletin  
**F-201-A**  
and state which size  
you are interested in





# These Makers Use— **CLIMAX**



Bay City Dredge Works,  
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ing, Cleveland, Ohio;  
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crane, Inc., Chicago, Ill.;  
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others.

## “The Trustworthy Engine”

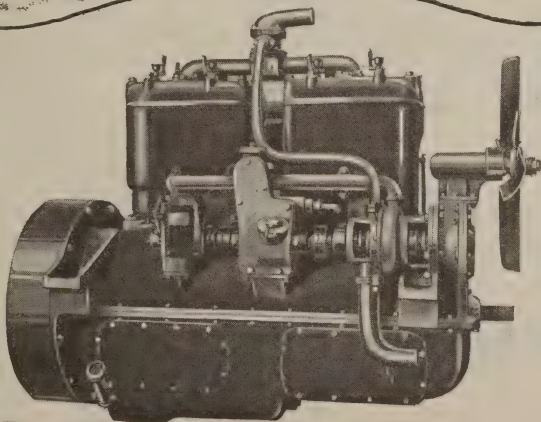
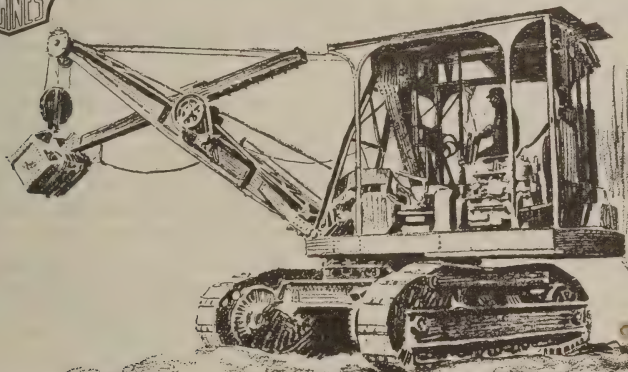
—as standard equipment in their cranes or shovels because careful tests have proven to them that No Other Engine gives the operator quite so much power with so little trouble and expense for operation and upkeep.

Let their experience be your guide.

*Write for Catalog*

**Climax Engineering Company**

13 W. 18th Ave., Clinton, Iowa





## Construction Similar to Steam Shovel

One of the outstanding features of Marion Electric Revolving Shovels is the similarity of construction with our standard steam machines. Many parts regularly used on the steam shovels are retained on the electric outfits.

The motors, being series wound, have high speed at light loads, and slow speed at heavy loads, characteristics that are also found in steam shovels and have much to do with their success. These features cannot be obtained on friction operated machines where the power is obtained from a single prime mover. The control levers have movements identical with the steam machines and any operator, familiar with the handling of a steam shovel, can understand and operate this new type.



## PURR R-R-R!

That's about all the sound you hear around a Marion Electric Revolving Shovel. Of course there is the traveling of the dipper in and out, the hum of the motors, and the familiar sound of the digging and rotating movements. But, all in all, it is quite different from the noise and dirt incidental to the operation of a steam shovel.

Where line current is available at reasonable cost; where fuel is expensive or difficult to get; where noise and dirt are objectionable, there is no type of excavator as desirable as a Marion Electric Shovel.

### Independent Three Motor Drive

The three major movements — hoisting, rotating and crowding—are each independent, a design very much different from single motor machines. With this design Marion eliminates troublesome frictions, brakes and clutches, and approximates the construction and operation of the well established steam machines.

If you are interested in electric excavators you will want to know more about Marion Power Shovels. Ask for Bulletin A-301 and let us have our representative call and show you where substantial savings can be effected.

# The Marion Steam Shovel Company

## Marion, Ohio

280-A

*Marion Crawler Trucks Make Hard Going Easy*





## These Accessories are Important! Select them with Care

**B**E SURE that the du Pont label is on your blasting accessories as well as on the explosives themselves—for the finest explosives made will not deliver maximum effect unless used with the best detonators and accessories. The experience of 121 years enables the du Pont Company to offer the most efficient and economical accessories for every class of explosives work.

Blasting Caps

Delay Electric

Blasting Caps

Blasting Machines

Galvanometers

Leading Wires

Tamping Bags

Electric Blasting Caps

Fuse

Delay Electric

Igniters

Rheostats

Cap Crimpers

Thawing Kettles

Write for Blasting Accessories Catalog containing description of above accessories and practical information about their use.

**E. I. DU PONT DE NEMOURS & CO., Inc.**

*Explosives Department*

**Wilmington - Delaware**

### *Branch Offices*

Birmingham . Ala.

Boston . . . Mass.

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*Du Pont Products Exhibit, Atlantic City, N. J.*

**DU PONT**

# MODEL 16—BAY CITY CRANE—EXCAVATOR



Has Made a Hit With The Crystal Sand Company of Bridgeton, N. J.  
by Outdigging Their Steam Shovels

## CONVERTIBLE

This  $\frac{3}{4}$  yd. shovel is only one of the attachments operated by the Versatile Bay City.

Use it also with:

- $\frac{3}{4}$ -yd. Clamshell
- $\frac{5}{8}$ -yd. Skimmer
- $\frac{3}{4}$ -yd. Dragline

One man operated CLIMAX 4 cyl. Gas Engine. Shipped without dismantling. Self-locking propelling device. Powerful cable crowd.

Gasoline or Electric Power

The Model 16 is sturdy and substantial—built to handle BIG YARDAGE at lowest cost day in and day out. We could build it cheaper but not better.

THERE ARE OTHER REASONS why the BAY CITY is the best dollar for dollar investment for you. Write for descriptive circulars.



FOR SMALL OPERATORS requiring only a low priced small excavator and loader we recommend THE ONE MAN EXCAVATOR. This "little Bay City" operates a  $\frac{3}{8}$ -yd. shovel or  $\frac{1}{2}$ -yd. clamshell. Caterpillar mounting. Gasoline or electric operation. The price complete is less than \$3,500. Write for catalogue "E."

**BAY CITY DREDGE WORKS**  
**BAY CITY, MICH.**



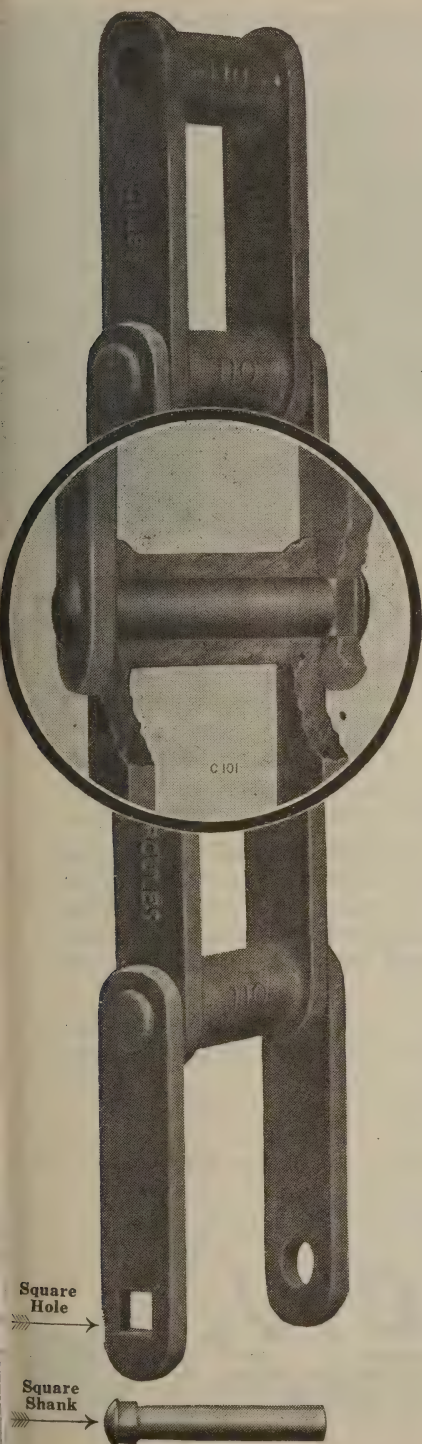
## *Handle Gritty, or Corrosive— Materials with Jeffrey Hercules Chain*

Jeffrey Square Shank Pin Hercules Combination Malleable Iron and Steel Chain is designed especially for extra heavy work in elevating and conveying gritty materials.

The "Hercules," a combination of malleable block links and steel side bars with steel pins, is the first step to all-steel types of chain, and therefore makes an economical chain in its wearing qualities and ability to withstand shock.

Used for drives of moderate speed. In elevator service usually attached to buckets in single or double strand—In conveyors of single or multiple strands with and without pusher attachments.

Held rigidly in the side bars, the Square Shank Pins distribute the wear to the long wearing surfaces of the solid links, with practically no wear to steel bars.



**The Jeffrey Mfg. Co.**

917-99 North Fourth St., Columbus, O.



## *Eliminate the Labor Problem*

In most modern brick plants the Thew Type 0 or 00 is recognized as a necessity to overcome the shortage, inefficiency and uncertainty of hand labor.

With the increasing demand many of the large Brick manufacturers have found it necessary to use larger equipment to handle the raw material and keep up production.

That is why the Walker & Frank Brick Company, of Detroit, has installed this 1 yard Thew. The A-1 with its greater capacity and power is keeping their production up to schedule at a low cost. Equipped with the continuous tread truck it can move about in slippery, boggy clay without the use of mats.

Thew Brick Yard shovels are built in three popular sizes for steam, gasoline or electric power. One of them will meet your requirements.

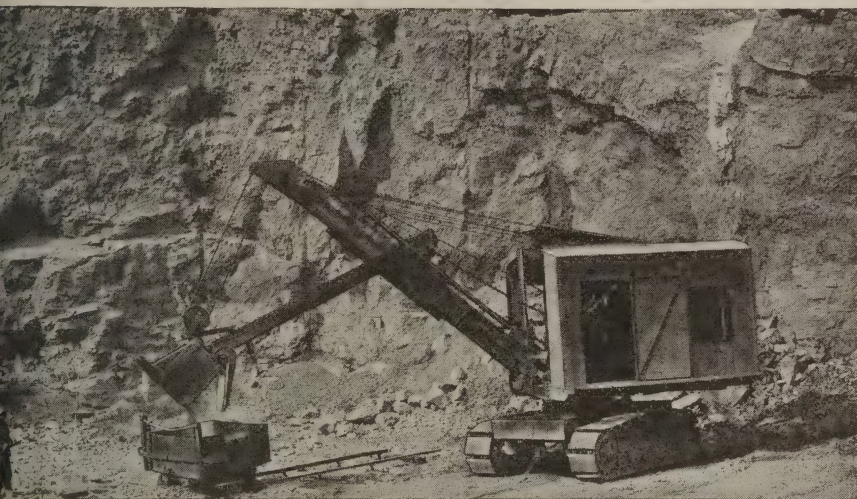
Write for more information.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

EXPORT DEPARTMENT  
ALLIED MANUFACTURING COMPANY OF AMERICA







*P & H 206 Electric Shovel—on the famous Corduroy Traction, operating in Wauwatosa Quarry. Owned by G. D. Francey.*

## Endurance and Power

### P & H Shovel—Electrically Driven

Having electricity available G. D. Francey specified electric motor drive when he ordered his P & H 206 Shovel for quarry service.

When the seven o'clock whistle blows, the operator by throwing the switch is ready to begin work immediately. The powerful crowding motion,—the strength and endurance of this rugged shovel make it ideal for long-hour days.

One man only is needed—easily controlling swinging, hoisting, crowding, traveling,—back of each movement of which is the total horsepower of the electric motor (or gasoline engine).

By replacing the shovel boom with crane boom, this same machine with attachments can be used as dragline excavator, skimmer excavator, backfiller, material handling crane or piledriver.

If you are interested in equipment that insures low operating and maintenance costs, the P & H is the machine you want.

Catalog on request.

*Excavating Machinery Division*

**PAWLING & HARNISCHFEGER CO.**

*Established in 1884*

*3851 National Ave., Milwaukee, Wis.*

*Offices and Agents in Principal Cities*



# CORDUROY SHOVEL



**"According to our observation it is an economical piece of equipment to have around."**

"According to our observation the 'American' Locomotive Crane is an economical piece of equipment to have around. With the 1¾-yard clamshell bucket it can unload a 40-ton car in less than half an hour. We have handled 25,000 tons of crushed rock with it this year. Very little attention is required to keep it in first class working order."

Duluth Crushed Stone Co.



# AMERICAN

## HOIST & DERRICK CO.



Saint Paul, Minn.

New York - Chicago - Pittsburgh - Seattle - New Orleans

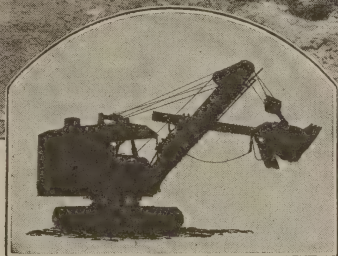


# McMyler- Interstate

# convertible



## 10-ton Crane



## $\frac{3}{4}$ -yard Shovel

The crane has a 30-ft., 35-ft., or 40-ft. boom and two power drums. The available line pull is 10,000 lbs.; for rapid bucket work, 6,000 lbs. With a quickly installed attachment, the crane will handle a  $\frac{1}{2}$ -yard drag line bucket.

The shovel has a full  $\frac{3}{4}$ -yard dipper, 20-ft. boom and 16-ft. dipper stick. These convertible machines are equipped with a separate sluing engine and steam rams, enabling the change from crane to complete shovel to be made on the job in a minimum time.

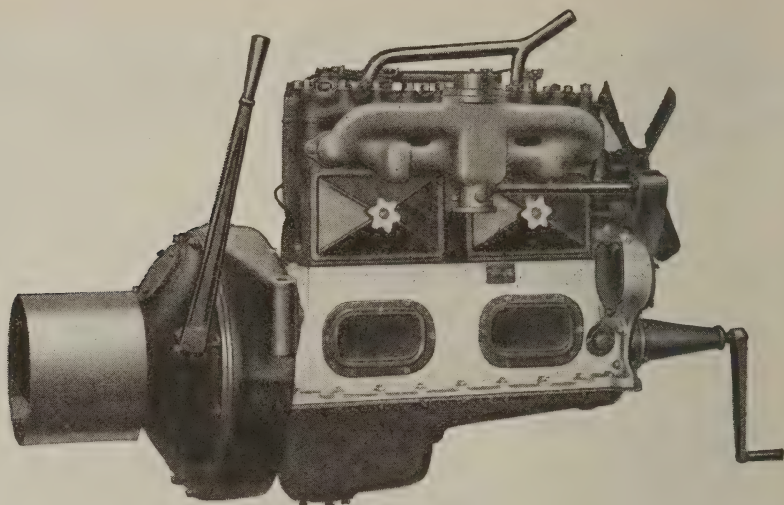
In operation, design and construction, this machine is 100% crane when arranged for crane operation and 100% steam shovel when converted for shovel work.

As a crane or as a shovel, the mechanism constitutes a complete unit capable of performing its requisite task efficiently and economically.

Crawler tread, tractor wheels and railroad types available.

**Locomotive Cranes - Pile Drivers - Derrick Cars - Car Dumpers**

**THE MCMYLER-INTERSTATE CO., Cleveland**



*Waukesha*  
TRADE MARK

Universal acceptance of the Waukesha Industrial Unit as the standard among "heavy duty motors" is complete endorsement of a motor unit that was planned and built because increased industrial uses and greater efficiency demanded a *better* motor. It was but logical that the building of such a motor unit should fall to America's pioneer motor specialists, for to build a unit of such outstanding merits demanded in craftsmanship alone the ability that is attained only through years of practical, constant workmanship under such able engineering supervision as has long characterized Waukesha, and distinguished the product bearing its name.

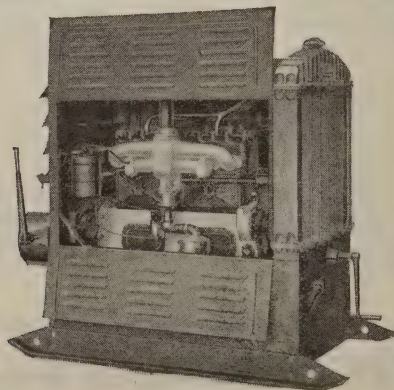
## The WAUKESHA MOTOR CO., Waukesha, Wisconsin

*The World's Foremost Builders of Bus, Truck, Tractor and Industrial Motors Exclusively*

### SALES OFFICES

1824-1825 Aeolian Building, 33 West 42nd St., New York  
503-505 Capitol Theatre Bldg., Madison Avenue Side, Detroit

### Showing the Industrial Unit and Power Take-Off





## *The Busy "Handy Man"*



**T**HAT spill of crushed stone, covering the tracks and holding up your shipments while men labored for hours, would have been a "pipe" for Truckcrane.

That big order, with a time limit clause, would have been out on time had you been able to quickly double up with a speedy Truckcrane.

As an efficient auxiliary unit, Truckcrane will suggest many ways to you for saving money and speeding up work.

Truckcrane comes to you equipped with its own 35 H. P. gasoline motor, ready to install on any 5 ton, or larger, truck measuring 9' 6" or over, from center of rear axle to back of driver's seat.

*Send for bulletin with the complete story*

THE BYERS MACHINE COMPANY  
430 Sycamore St.,  
RAVENNA, OHIO

# TruckCrane



# WILLAMSPORT

## WIRE Patented Telfax Tape Marked ROPE

is especially adapted for maximum service on

### THEW SHOVELS

—and the TELFAX system of marking each grade by a colored tape woven into and throughout the hemp core, is a protection every operator should demand, for his own safety, as well as that of his employees.

Thew or any Shovel Co. will be glad to supply Williamsport Telfax Marked Ropes on your equipment without additional charge if you request it. It is standard equipment on some makes of shovels.

*Write for our booklet MWR which  
tells an interesting illustrated  
story about the "Telfax" Marker.*

Our new catalog is just off the press—send for it

## WILLIAMSPORT WIRE ROPE COMPANY

Main office and works  
Williamsport, Pa.

Gen'l Sales office  
Peoples Gas Bldg., Chicago, Ill.



# **"Hercules" <sup>Red Strand</sup> Wire Rope**

## **Reduces Operating Cost**



The unusual ability of HERCULES (Red-Strand) Wire Rope to withstand severe jerks, pulls, bends and wear makes it an exceedingly economical rope for use on sand, gravel and quarry equipment. It has seen



REG. U.S. PAT. OFF.

much service in work of this kind and its constant increase in popularity is due to its record of accomplishment.

The one red-strand in HERCULES Wire Rope is our guarantee that its high quality is constantly maintained.

Made Only By

## **A. Leschen & Sons Rope Company**

(Established 1857)

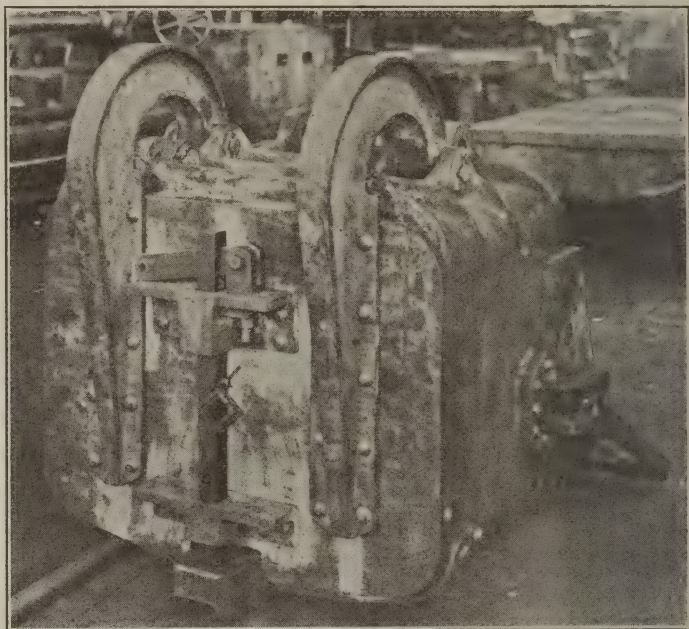
**St. Louis, Mo.**

New York

Chicago

Denver

San Francisco



## For Severe Digging

The Tisco manganese steel one-piece dipper is an effective dipper for severe service. It has no riveted joints to become loose and can be obtained at practically the same cost as the long used built up type dipper with plate steel sides.

Equipped with a renewable manganese steel lip, carrying Reversible Van-Port points, a Tisco one-piece dipper will give you the type of service that you have the right to expect. These dippers are made in sizes  $\frac{5}{8}$  yd. to  $2\frac{1}{2}$  yds. capacity for all makes of shovels. May we send you further details and quotations?

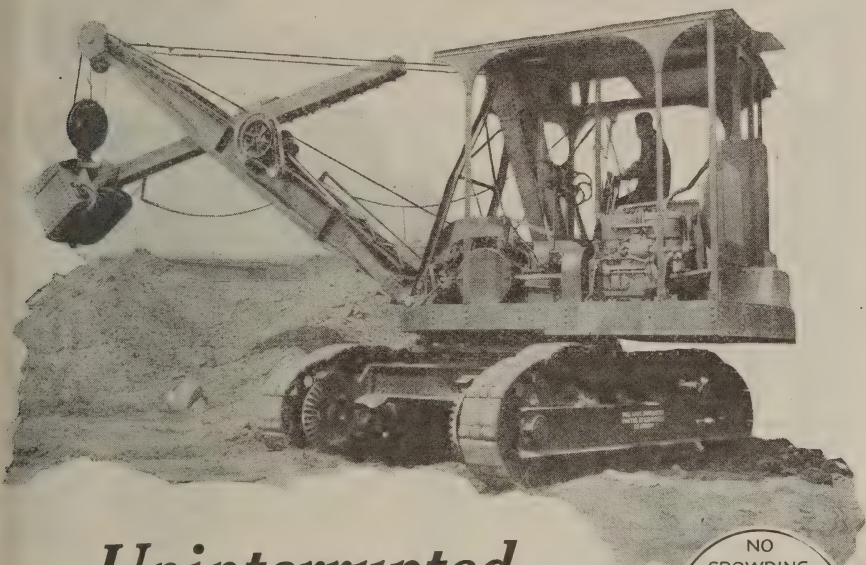
## Taylor Wharton Iron & Steel Co. HIGH BRIDGE, NEW JERSEY

### DISTRICT SALES OFFICES:

30 Church St., New York City  
208 S. La Salle St., Chicago  
1418 Oliver Bldg., Pittsburgh  
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## Uninterrupted Service

with the New O. S. Gasoline Shovel on  
Crawler Tread

You know what features in a shovel give the most trouble—crowding ropes that stretch and break or chains and sprockets that require adjustment. These trouble-makers have been eliminated in the New O. S. Gasoline Crawler Shovel. Smooth running, powerful steel gears do their work with utmost efficiency and economy of power.

The O. S. Gasoline Shovel is built for those open minded operators who want better equipment.

If you want to know more—how it works, what it will do—just fill out and send us the coupon. Your inquiry will be answered promptly, without obligation.

Turn to Page 104 This Number for Further Description.

### ORTON & STEINBRENNER CO.

CRANES—SHOVELS—BUCKETS—CRUSHERS

608 S. Dearborn St., CHICAGO, ILL.

FACTORY  
HUNTINGTON, IND.

NO  
CROWDING  
ROPE  
TO  
STRETCH  
OR  
BREAK

NO  
CHAINS  
OR  
SPROCKETS  
TO  
ADJUST

INTER-  
CHANGEABLE  
BOOM  
GEARED  
CRAWLER  
TREAD

THE  
ORTON &  
STEINBRENNER CO.  
608 S. Dearborn St.  
CHICAGO, ILL.

Date .....

Please send me complete  
description of your Depend-  
able Gasoline Shovel.

Name .....

Address .....

# HERCO BLASTING POWDER

for

## *Hercoblasting*

Cordeau

40'

FF Granulation

HERCOBLASTING REDUCED COSTS 30 PERCENT AT THIS QUARRY. The holes marked with crosses were loaded with black powder and were fired by our new method. The other holes contained dynamite. Results were equally satisfactory, but the cost per hole of the dynamite averaged \$198.00, against \$138.00 per hole for black powder.

Herco Powder

34'

Cordeau

Six hundred pounds of FF blasting powder loaded in a six-inch hole makes a column about 40 feet high.

Six hundred pounds of Herco blasting powder loaded in a six-inch hole makes a column about 34 feet high.

### A New Blasting Method

**A** SAVING of at least thirty percent in blasting costs at many quarries and other operations using column loading in well-drill holes can be made by Hercoblasting, a new method of blasting in which black powder in column loads gives results equal in every way to those obtained from dynamite.

Hercoblasting is only applicable to work for which column loading is economical. It is not suitable where the slow, heaving effect produced by pocket loads is required.

A more compact column load is obtained with *Herco* blasting powder than other granulations. *Herco* powder is composed of grains of various sizes; the finer

grains fill the spaces between the larger ones. This is the reason that six hundred pounds of *Herco* blasting powder in a 6" hole occupies a column about 5' less in height than the same weight of FF blasting powder. With *Herco* blasting powder a heavier explosives charge is concentrated at the toe, where it is most needed.

Figures showing the saving which Hercoblasting has made possible at quarries in different parts of the country are given in the article entitled *A New Method of Blasting*, in the April number of *THE EXPLOSIVES ENGINEER*. If you have not read this article, ask our Advertising Department, 944 King Street, Wilmington, Delaware, to send you a free copy.

# HERCULES

---

## POWDER COMPANY

Allentown, Pa.  
Birmingham, Ala.  
Buffalo, N. Y.  
Chattanooga, Tenn.

Chicago, Ill.  
Denver, Colo.  
Duluth, Minn.

Hazleton, Pa.  
Huntington, W. Va.  
Joplin, Mo.  
Los Angeles, Calif.



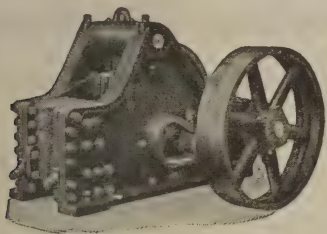
Louisville, Ky.  
New York City  
Norristown, Pa.  
Pittsburg, Kan.

Pittsburgh, Pa.  
Pottsville, Pa.  
St. Louis, Mo.

Salt Lake City, Utah  
San Francisco, Calif.  
Wilkesbarre, Pa.  
Wilmington, Del.



# STURTEVANT "OPEN DOOR" MACHINERY

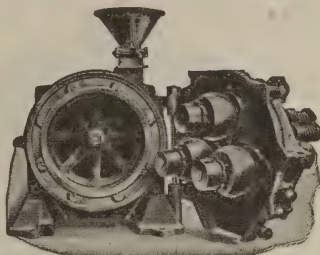


## JAW CRUSHERS

For crushing anything crushable, that is friable.

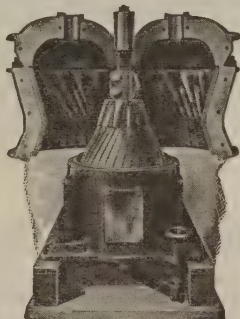
Coarse Crushers—Output: 2" to 6".  
Intermediate Crushers—Output: 1" to 1½".

Fine Crushers—Output: ½" to 1".



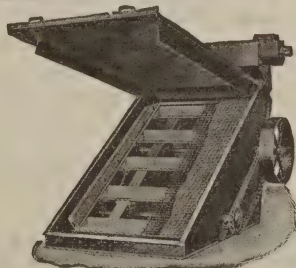
## RING-ROLL MILL

Most durable and efficient grinder for hard and moderately hard rock or ore. Used for the reduction of Cement-Clinker, Limestone, Quartz, Ores, Granite, Trap, Phosphate, Coal, etc., etc.



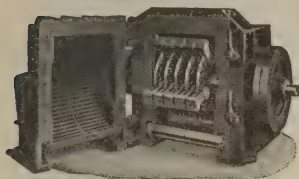
## ROTARY FINE CRUSHERS

For crushing large pieces of soft and moderately hard materials. A most popular and widely used machine.



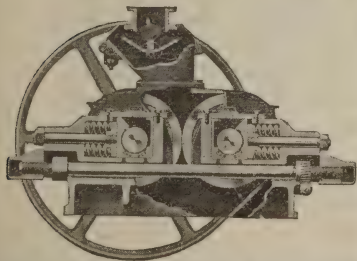
## SEPARATORS

Screen everything screenable.



## SWING-SLEDGE MILLS

For pulverizing soft and moderately hard materials such as Limestone, Lime, Talc, Clay, Chalk, Salt, Coal, etc., etc.



## BALANCED CRUSHING ROLLS

For coarse or fine work, wet or dry, on hard or soft rock and ore.

## ELEVATORS

# STURTEVANT MILL CO.

HARRISON SQ., BOSTON, MASSACHUSETTS

# A NEW CRUSHER

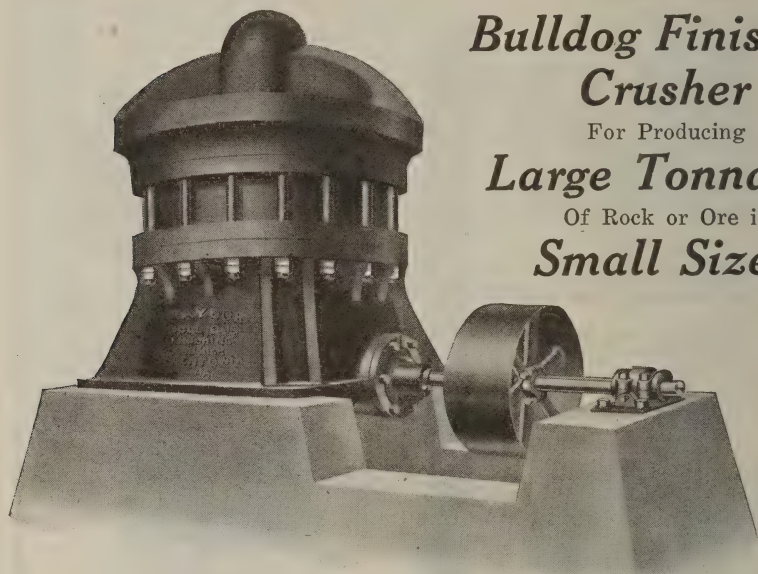
*It's the  
Bulldog Finishing  
Crusher*

For Producing

*Large Tonnages*

Of Rock or Ore in

*Small Sizes*



## THE BULLDOG FINISHING CRUSHER

Built in size 10 in. for minus  $1\frac{1}{2}$  in. product. Size 6 in. for minus  $\frac{3}{4}$  in. product

A GYRATORY CRUSHER designed and specially built for Fine Crushing—combining Vertical Concaves that can be quickly and easily turned end for end to assure maximum wear and use Without the use of Zinc, Heavylifts or Dis-mantling the crusher, with the features that have made the BULLDOG GYRATORY the leading crusher of this type built.

*For Particulars Write the Nearest Traylor Man*  
—TODAY—

## TRAYLOR ENGINEERING AND MANUFACTURING COMPANY ALLENTOWN, PA.

NEW YORK  
30 Church St.

SALT LAKE CITY  
101 W. Second South St.

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1208 Fulton Bldg.

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Moore Block

CHICAGO  
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SEATTLE  
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LOS ANGELES  
I. W. Hellman Bldg

LAREDO, TEXAS  
1808 Farragut Av

EXPORT DEPARTMENT, 104 PEARL ST., NEW YORK CITY. CABLE ADDRESS "FORSALTRA"

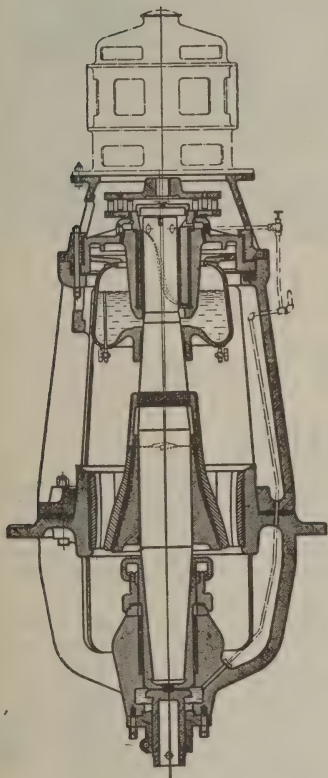
International Machy. Co.  
SANTIAGO, CHILE

W. R. Grace & Co.  
LIMA, PERU

International Machy. Co.  
RIO DE JANEIRO, BRAZIL



# The Weston Direct Drive Gyratory Crusher for Secondary Reduction of Hard Rock, Ore and Gravel. Developed in a Granite Crushing Plant



This machine fills the need for a secondary crusher of large capacity and great strength for work in all friable rock.

The first machine, installed more than two years ago, has established remarkable records for capacity, low power consumption and general economy in operation. Later installations have more than proved all claims for the machine.

The construction is all steel with Chrome-Vanadium forged steel shaft of large size, and with full-bearing eccentric, bronze bushed inside and out.

The entire machine is arranged to give freedom from costly delays. Positive lubrication without pumps—Dust prevention in bearings—Greater wear on manganese before replacement—ease of adjustment and repair—and a sturdy oversize motor—All work to your advantage.

Crusher is simple in design and the best practice in modern Engineering is utilized.

Built in six standard sizes to follow any primary, smallest machine can be set to  $\frac{1}{2}$ " with large capacity. Arranged for motor or belt drive.

Bulletin No. 25-P describes this machine in detail.

**THE MORGAN ENGINEERING CO.,**

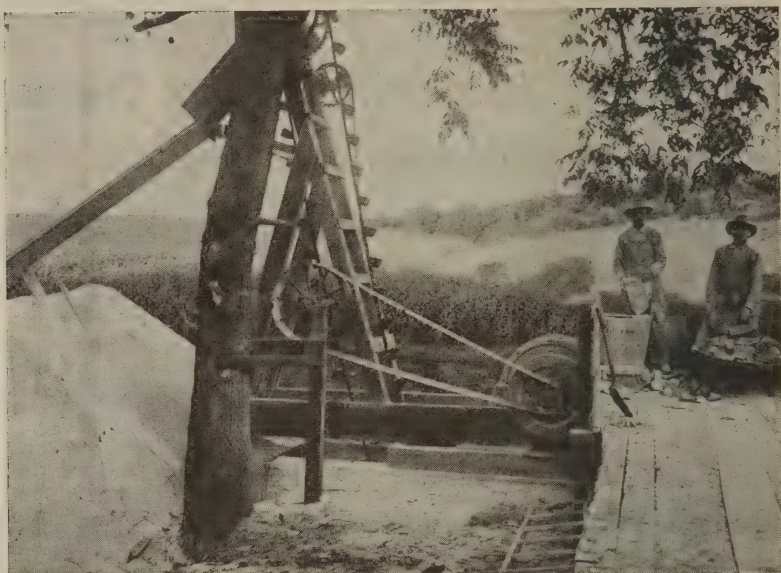
**Alliance, Ohio**

Designers, Manufacturers and Contractors  
Electric Traveling Cranes, Rolling Mill Machinery  
Ordnance, Steel, Shipbuilding and Forging Plants Complete  
Rock Crushers, Special Machinery for Any Purpose

Chicago, 122 S. Michigan Ave

Pittsburgh, 1420 Oliver Bldg.

Birmingham, Ala., Brown-Marx Bldg.



## Crushes One Man Limestone to Agricultural Size in One Reduction

The unequalled demand for agricultural limestone now offers excellent opportunities for the profitable production of this material. Mr. Otto Orth, the owner of the above installation, says, "Paid for itself in 4 months." Guaranteed to crush 10 tons per hour, it is actually reducing 12 to 15 tons and the machine has cost nothing for repairs in 2 years operation.

Williams Jumbo Crushers are unequalled for this work as they crush stone up to 14" to agricultural size in one operation and make unnecessary the expense of a pulverizer. It is also adjustable to make macadam, in fact many operators swear by them. E. H. Bradbury, Kansas City, says, "Supplanted Jaw Crusher and Gyratory and product is superior."

If you have rock to crush—any size to any fineness, write for Williams service records.

**WILLIAMS PATENT CRUSHER & PULVERIZER CO.**

802 ST. LOUIS AVE., ST. LOUIS, MO.

Chicago  
37 W. Van Buren St.

New York  
15 Park Row

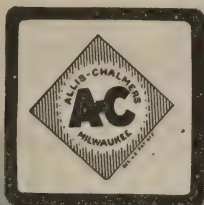
San Francisco  
67 Second St.



# Williams

**PATENT CRUSHERS GRINDERS SHREDDERS**





## Allis-Chalmers Announces a New Gyratory Crusher

The following  
advantages should be  
considered:

- 1—Less Friction than so-called low down or short frame crushers.
- 2—Horse power reduced to a minimum, through the use of cut steel gears, and forced lubrication.
- 3—Greater discharge opening and stronger construction.
- 4—Machine can be made either regular drive, right hand or left hand by simply locating the bearing in the proper opening.
- 5—The lubrication is of the simplest and the most positive design.
- 6—Larger diameter shaft with 50% greater strength.
- 7—The reduction of installation height of 16% of the present gyratory crushers.
- 8—Improved hopper design.
- 9—Dust proof.

WRITE FOR FURTHER  
INFORMATION.

*Our Engineers are pleased to be  
consulted*

### Allis-Chalmers Products

Air Brakes  
Air Compressors  
Cement Machinery  
Condensers  
Crushing Machinery  
Electrical Machinery  
Electric Hoists  
Farm Tractors  
Flour Mill Machinery  
Forgings  
Gas Engines  
Hydraulic Turbines

Mining Machinery  
Oil Engines  
Perforated Metals  
Pumping Machinery  
Reciprocating Pumps  
Saw Mill Machinery  
Steam Engines  
Steam Hoists  
Steam Turbines  
Timber Treating and  
Preserving  
Machinery

The New Gyratory Crusher

# ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.



## Cast Iron's All Right in a Foundry

—but you don't find it in a blacksmith shop

Cast iron is a splendid material for a great many purposes—but don't hit it. A cast-iron-frame hammer mill may last a long time—but something's going to break when a stray bolt or piece of steel gets in. And then there's nothing to do but buy a new frame. Time out, lost production and the cost of a new part.

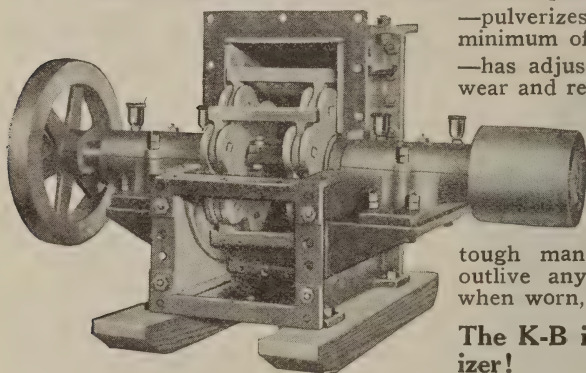
### The K-B Pulverizer is STEEL throughout!

It is insured against the chance of damage through accident. From the big, heavy cast steel frame to the tough, hard, manganese steel hammers, breaker blocks and lining plates, it is built to stand the gaff. The manganese steel lining plates will outlive an ordinary pulverizer and when renewed, which is easily done, the machine is practically as good as new.

### The K-B Pulverizer

—is the Hammer Mill that:

- is made throughout of high grade indestructible steel;
- throws the entire hammer weight on the point that hits the rock;



—pulverizes by impact—therefore a minimum of wear on the screen;

—has adjustable hammers to take up wear and regulate fineness of product;

—has screens that slide in or out as easily as a desk drawer;

—has all wearing parts—hammers, breaker blocks, lining plates—of

tough manganese steel. They will outlive any ordinary pulverizer and, when worn, can easily be replaced.

**The K-B is the Economy Pulverizer!**

*Buy Crushing Equipment on the Low-Cost-In-the-Long-Run Basis. Send us your inquiry! The K-B Catalog will tell you what you want to know.*

**K. B. PULVERIZER CORPORATION**

**92 Lafayette Street, New York, N. Y.**

**K-B** *The All Steel Hammer Mill*  
**Pulverizer**





***Pays for itself with  
the money it saves***

- ① *Lower Cost Per Ton*
- ② *Lower Construction Cost*
- ③ *Lower Maintenance Cost*
- ④ *Lower Labor Cost*

# **SYMONS**

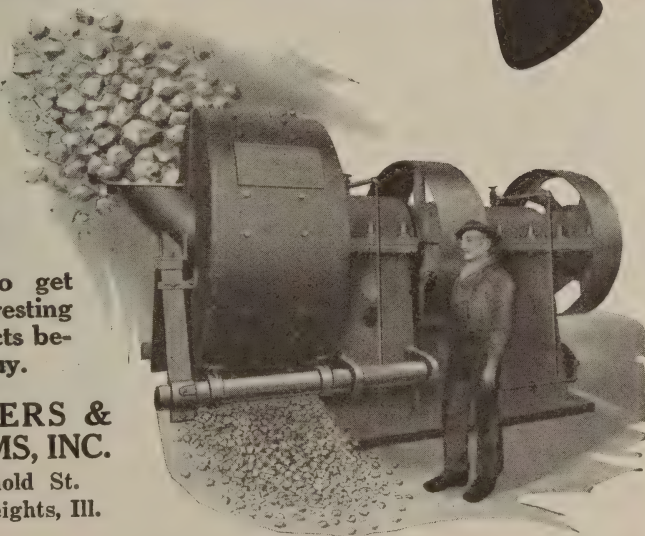
## ***Horizontal Disc Crushers***

—Also  
Less  
Loss  
in Fines

Be sure to get  
our interesting  
story of facts be-  
fore you buy.

**CHALMERS &  
WILLIAMS, INC.**

1430 Arnold St.  
Chicago Heights, Ill.



# The Columbus Conveyor Co.



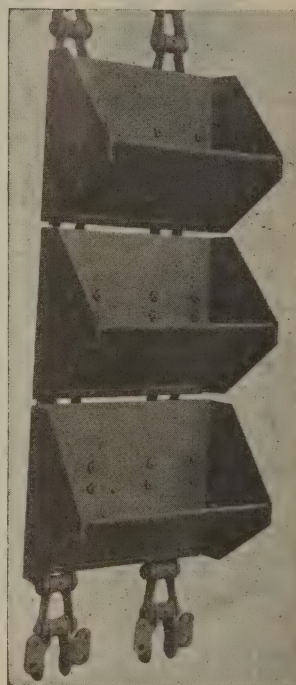
Elevators.  
 Belt, Scraper,  
 Flight & Screw  
 Conveyors.  
 Car Loaders.  
 Unloaders.  
 Portable Belt  
 Conveyors.  
 Bins.  
 Buckets.  
 Chains.  
 Etc.

Above is pictured an efficient yet inexpensive installation quite common at the average gravel pit. The gravel is fed through bar grating and hopper to the troughing belt conveyor, through crusher and elevated to overhead bin.

The demand for our improved type of combination steel structural bin with planked sides and bottom, built in 30 ton and 50 ton capacities, has been far beyond our expectation. The price and construction will interest you.

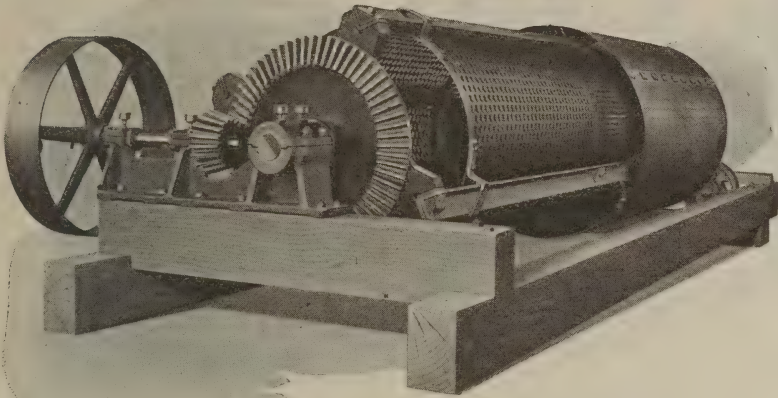
Note our special two-piece stone bucket with the reinforced projection edge and outside rivets. Furnished in any size desired and any weight of metal. Also other types of steel and malleable buckets.

Let us have your inquiries — Our prices and equipment will satisfy you.



**THE COLUMBUS CONVEYOR CO.**  
 COLUMBUS, OHIO





## TOEPFER SCREEN

The Toepfer screen is built of the best materials, to stand the most severe strain and wear. The head end ring at the receiving end is cast in one piece of cast steel or semi-steel, the drive gear is cast on the discharge end head, and the bearing at this end is a one piece casting, making this screen a most desirable unit.

We build this screen in several sizes.

REVOLVING SCREENS

SCRUBBERS

ELEVATORS

FEEDERS

GRIZZLYS

CONVEYORS

BIN GATES

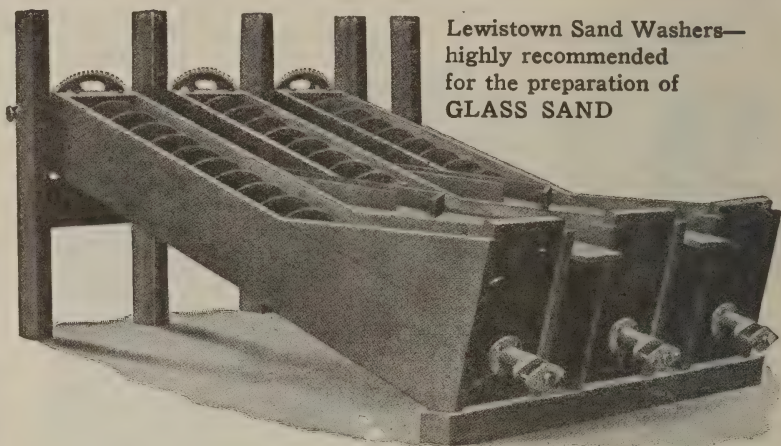
PERFORATED METALS

*Catalog Upon Request*

**W. TOEPFER & SONS CO.**

BROADWAY & MENOMONEE ST.

MILWAUKEE, WIS.



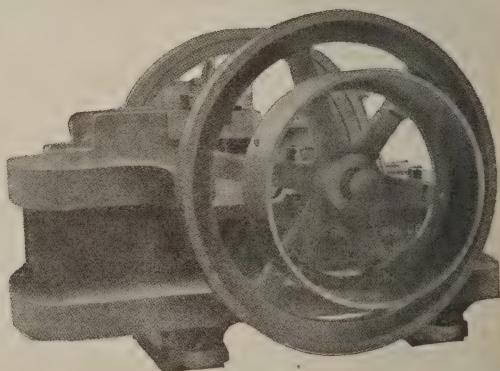
Lewistown Sand Washers—  
highly recommended  
for the preparation of  
GLASS SAND

## IS YOUR PROBLEM LISTED HERE?

We are in position to help you meet your problem in a speedy, satisfactory manner, if it pertains to crushing, grinding, screening, washing, drying or conveying, for we manufacture a full line of this equipment for pit and quarry service.

These are reasonably priced, well built, compact outfits—efficient and quickly installed.

Will you drop us a line, stating what equipment you desire information on?



---

**Lewistown Fdy. & Machine Co.**  
LEWISTOWN, PENN.



# Seeing You Through

**W**E do not feel that our responsibility ends when we sell you explosives. *We want to see you through.* We are as anxious as you to get a clean pull.

Grasselli Explosives will do your blasting job—right.

Call for one of our practical field men if you have a blasting problem. These men are not high brow oracles but Practical men who have made a special study of explosives and blasting and who are anxious to co-operate with you.

Just call our nearest office.  
No cost—no obligation.

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## The Grasselli Powder Company

Main Office: Cleveland, O.

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# GRASSELLI EXPLOSIVES



## It takes more than a good drill—

to get real drilling efficiency. Even the best of drills won't live up to their reputation if there is power loss at the compressor.

"Domestic" Air Compressors are so constructed as to utilize without loss in transmitting, all power generated by the engine for compressing air. With a "Domestic" your drills will do their best work under any conditions.

In addition "Domestic" Air Compressors are portable and easily moved—another time saving factor that adds to the general efficiency of your drilling work.

Write to-day for Bulletin 22 AP. It contains full details of the outstanding features that make the "Domestic" a superior compressor.

**DOMESTIC ENGINE & PUMP CO.**  
SHIPPENSBURG, PENNA.

**"DOMESTIC"**





Illustration shows a CP-5S Mounted Sinker—one of a variety of sizes and types, mounted and unmounted.

## 66⅔% Lighter—32-40% Faster

**C**OMPARED with a 3¼-inch piston drill the CP-5S Mounted Sinker—a member of a new line of rock drills consisting of eight types—weighs 66⅔ per cent. less and drills from 32 to 40 per cent. faster.

For example, in a limestone quarry, a 330-pound 3¼-inch piston drill averaged 60 to 75 feet per shift. Under similar conditions a 112-pound CP-5S Mounted Sinker drilled 150 to 200 feet.

Both the CP Sinker and Drifter types embody these unique features: Spool valve that insures high cutting speed. Throttle valve that turns freely at all pressures. Absence of knobs or projections. Ease of set-up without changing alignment. Effective clearing of water and cuttings from steel and hole. Dust-proof, completely enclosed front head.

Another fast-cutting CP Rock Drill is the CP-5 Mounted Drifter which, during various tests, has equalled and even excelled the drilling speed of 160 to 170 pound drifters, in formations varying in hardness from slate to jasper.

Demonstration without obligation. Complete details contained in Special Publication 697.

Request your copy.

Besides a complete line of rock drills, this company manufactures portable, semi-portable and stationary air compressors, oil, steam, gasoline and electric-driven types. Also, oil, steam and gas engines. Descriptive bulletins sent upon request.

### Chicago Pneumatic Tool Company

Chicago Pneumatic Building · 6 East 44th Street New York

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R-19

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# CHICAGO

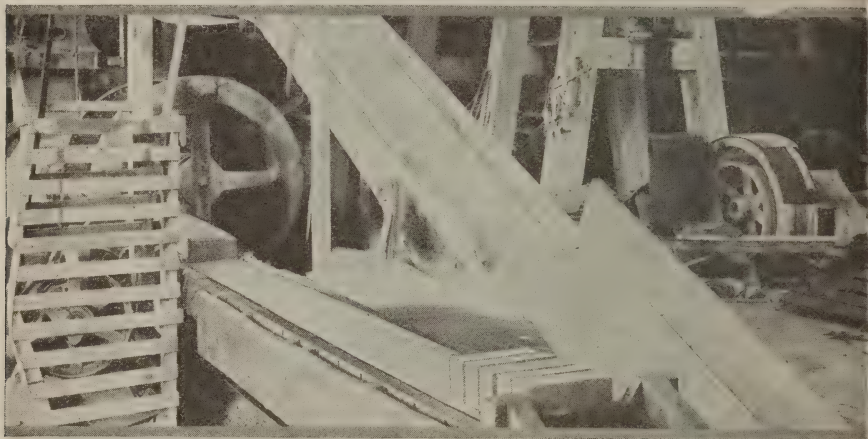
Rock



# PNEUMATIC

Drills

# GANDY BELT *is* TOUGH



## Gandy Saves Money on the Waste Conveyor

MANY superintendents neglect the waste clay conveyor. They fail to figure the cost of a break-down, with clay piled up around the off-bearing-belt causing a general nuisance and expense. However, this isn't true at the Onondaga Brick and Tile Company plant. Four years ago they put the 14" 4-ply Gandy, shown in the picture, on their waste clay conveyor. It is still in excellent condition, and the Onondaga people are so pleased with it that their treasurer, Mr. R. C. Williams has written us a letter praising Gandy service. A Gandy will save money on your waste conveyor. It's a tough belt, built right for clay-products uses.

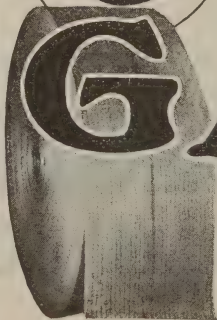
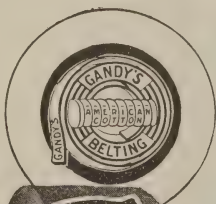
*"It's the Belt with the Green Edge"*

**THE GANDY BELTING CO.**

MAIN OFFICE AND FACTORY 750 W. PRATT ST. BALTIMORE

NEW YORK: 36 WARREN STREET

CHICAGO: 552 W. ADAMS STREET

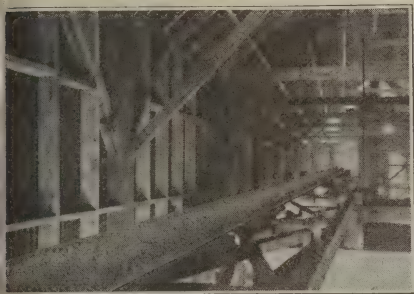


# GANDY

STITCHED COTTON DUCK

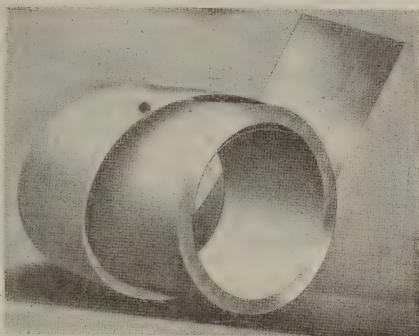
# BELT





*Sandvik Steel Belts are made of high grade Charcoal Steel, cold rolled, hardened and tempered.*

*16 inch Sandvik Steel Belt Conveyor handling limestone at the Waukesha Lime & Stone Company's plant.*



## Twenty-four Hours a Day for Seven Years

In 1915 the Skanska Cement Co. of Sweden installed Sandvik Steel belt conveyors for handling limestone. After seven years of service these belts are still working twenty-four hours a day and have required no repairs of any description.

Mr. L. L. Griffiths, Consulting Engineer, and Superintendent of the Michigan Portland Cement Co., Chelsea, Mich., writes:

"This will advise you that we have had operating at this plant since Sept. 1st, 1922, one of your 16" Sandvik Steel Conveyor Belts.

This belt is handling run-of-kiln clinker after same has passed through a 60' cooler, and the temperature of the material handled has ranged from atmospheric temperature of 32 deg. F. when the clinker has been thoroughly wet with water, during the winter, to 100 deg. F. when there has been no water on the same.

THE AVERAGE LENGTH OF LIFE OF CONVEYOR BELTS USED PREVIOUSLY AT THIS POINT HAS NEVER IN THE HISTORY OF THE PLANT BEEN MORE THAN 90 DAYS, AND WE ARE VERY WELL SATISFIED WITH THE PERFORMANCE OF YOUR BELT THUS FAR.

In addition to this belt we have also installed and operated a similar size belt conveying crushed coal from a Williams Crusher to our Power Plant and have on hand ready to install another belt distributing mixed clinker and gypsum to our preliminary grinders on the Finishing End."

See our exhibit at the 9th Exposition of Chemical Industries, Grand Central Palace, New York City, week of September 17, 1923.

Our Engineering Service is at your disposal for the asking.

Copy of our booklet, "Sandvik Steel Belt Conveyors" will be gladly sent on request.

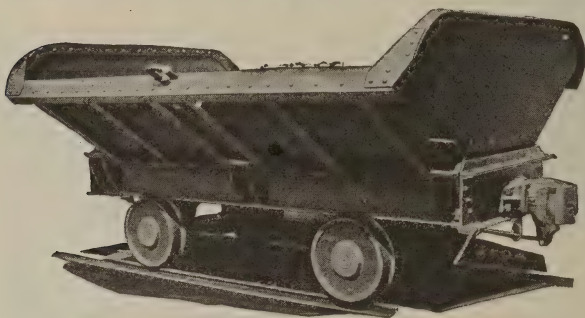
**SANDVIK STEEL INC.**

WOOLWORTH BUILDING  
233 BROADWAY, NEW YORK, N. Y.

*Sandvik*

**STEEL BELT CONVEYORS**

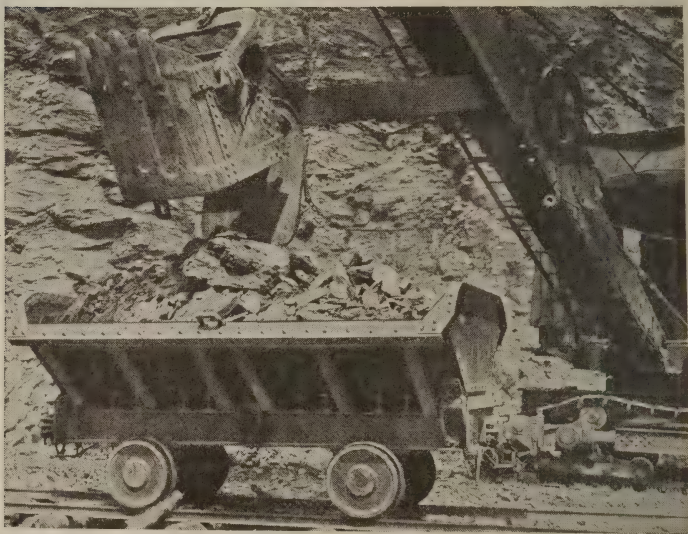
# EASTON QUARRY CARS



## TYPE 5794

**Bulletin 21**

shows other  
types of  
quarry cars.  
Sent on re-  
quest.



### *"Quarry Car Practice"*

Published Every Now and Then

Part four is now being distributed. This issue contains over 50 illustrations of cars in actual service

**Easton Car & Construction Co.**  
**EASTON, PA.**

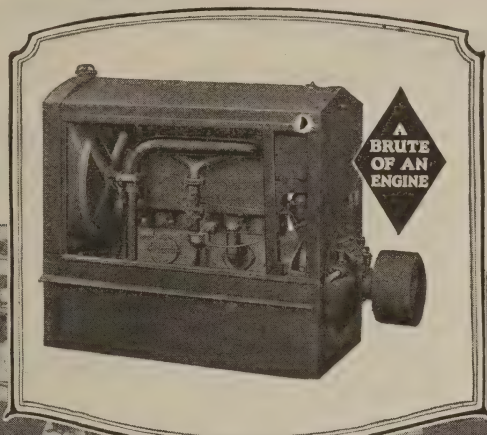
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# EASTON INDUSTRIAL CARS







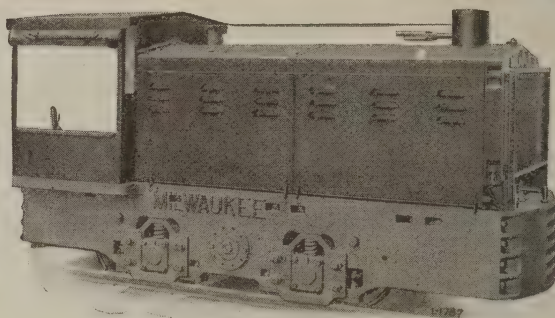
## Works Like a "Beaver" Out in the Open

In the great open space—sun and rain—worry Beaver Power Unit little. It is built essentially for sand pits and quarries and its life is not shortened by exposure. A sturdy all-steel housing protects it from down-pours and allows it to carry-on under all weather conditions. Exactly why its popularity is ever increasing. Besides it has proven itself in the field as a **Brute of an engine**. It is a deep breathing valve-in-the-head engine built for the severest work and leadership. It can drive hoists, conveyors, pumps or the complete plant with the strength of a brute.

BEAVER MANUFACTURING CO.  
35—25th Street, Milwaukee, Wisconsin

*There is a size Beaver Power Unit particularly adaptable to your requirements. It will burn gasoline, kerosene, or distillate. Get detailed information from a Beaver distributor or write direct.*

# FOR STEADY SERVICE Beaver



## Economical Haulage

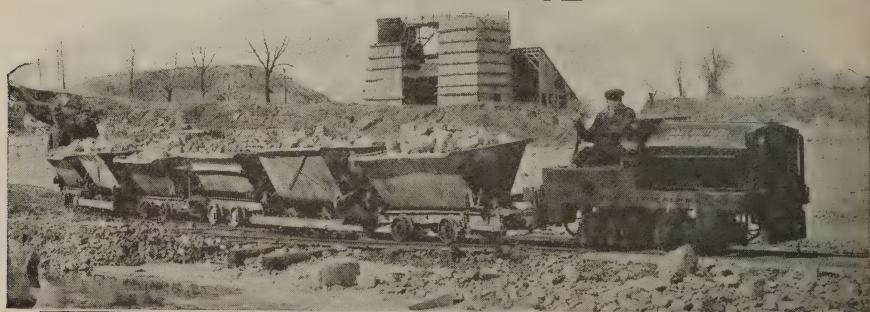
When you put a MILWAUKEE on the job you have the *satisfaction* of knowing that you have a real locomotive—one that you can bank on to reduce your haulage costs.

*All Milwaukee Locomotives are sold on the basis of performance—they're guaranteed.*

Write for Catalog M-121—today—NOW!

**MILWAUKEE LOCOMOTIVE MFG. Co.**

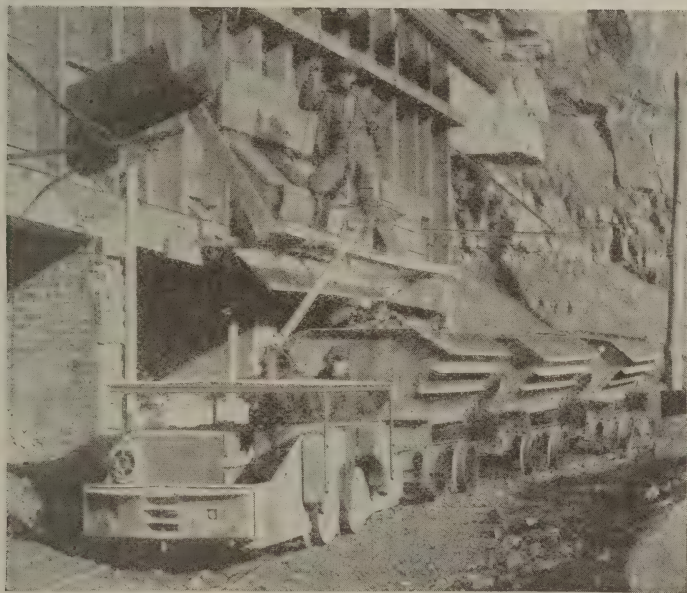
MILWAUKEE, WISCONSIN  
U. S. A.



# MILWAUKEE GASOLENE LOCOMOTIVES



## It Costs No More— To Pull Your Cars Electrically



It costs no more. It's easier, cleaner, quicker, and more economical.

And almost anybody around the plant can run an electric locomotive.

Big savings reported by the brick company using the locomotive pictured above.

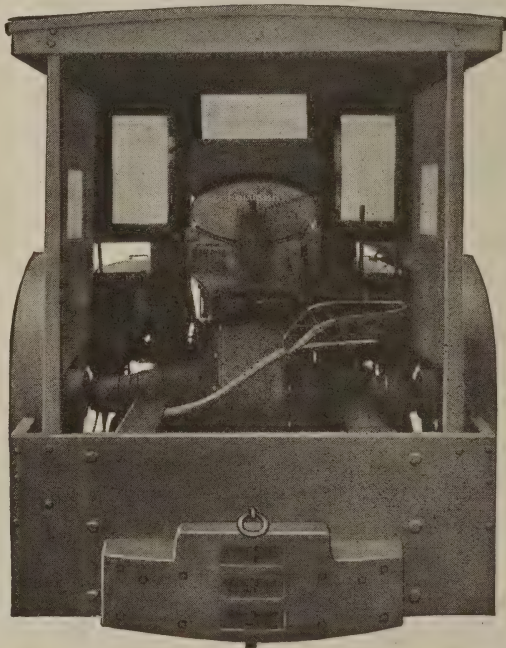
A letter from you will bring more detailed information.

We shall be glad to give you, without any obligation, the benefit of our experience. If an electric locomotive won't pay in your plant, we'll tell you so.

|                                      |                                   |                   |
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| <b>GOODMAN MANUFACTURING COMPANY</b> |                                   |                   |
| PITTSBURGH                           | 4746 to 4854 South Halsted Street | CINCINNATI        |
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During 1918 we made an installation of Brookville Locomotive at the plant of the Clarion Fire Brick Co., St. Charles, Pa. Machine successfully replaced five mules, formerly used for moving clay from mine to bins at mill. Late in 1922 this older machine, due to increased tonnage was replaced with our later and heavier Brookville-Fordson. Upper cut shows Fordson type with regular train of 12 cars working between mine and mill. All work is taken care of on a 6 mile working speed in both forward and reverse.



Their Superintendent advises six mules could not take care of present tonnage that machine is handling with ease. He also makes this statement: "We would not take three times the price paid for machine."

Two types of Brookville Locomotives, the lighter up to 2½ Tons Weight with standard Ford truck driving unit, suitable for the lighter operations; for heavy duty service our heavy four wheel drive with Fordson unit; 100% intact insuring 100% Fordson Service.

All gauges 24" to 56½".

*Write us for special Bulletins*

## **BROOKVILLE TRUCK & TRACTOR CO.**

**BROOKVILLE, PA., U. S. A.**

**A. J. Alsdorf Corporation, Chicago, U. S. A.**  
Exclusive Foreign Distributors.



STEPHENS-ADAMSON MFG. CO. • LABOR SAVING MACHINERY  
ENGINEERS AND BUILDERS OF GRAVEL PLANT EQUIPMENT

# Gravel Washing

CLEAN aggregate is essential for the production of good concrete. Gravel must be thoroughly washed to remove the clay film which is present in bank-run material and which is detrimental to bonding qualities of any cement.

S-A sand and gravel washing and screening plants are producing the highest grade concrete gravel with standard equipment. Each plant is designed in accordance with standards established after years of successful experience in this field.

The design of each sand and gravel project presents new and important problems which must be given careful study by experienced technical men. S-A engineers are designers of successful plants and their services are available to those contemplating new projects.



• • • Write for Section 5 Catalog • • •

Stephens-Adamson Mfg. Co., Aurora, Illinois



## Unearthing Buried Treasure

That's what the **Godfrey Slack-line Excavator** is doing for sand and gravel producers today. Thousands of dollars have been lying in these rich deposits, waiting for the right equipment to unearth them—and now it's here.

The **Godfrey Slack-line Excavator** is the result of years of experience in the manufacture of high grade conveying machinery. It is in no sense an experiment, having been thoroughly tried out, tested and proved by actual performance in the hands of satisfied owners. You will be interested in securing the facts and figures.

ASK FOR BULLETIN O

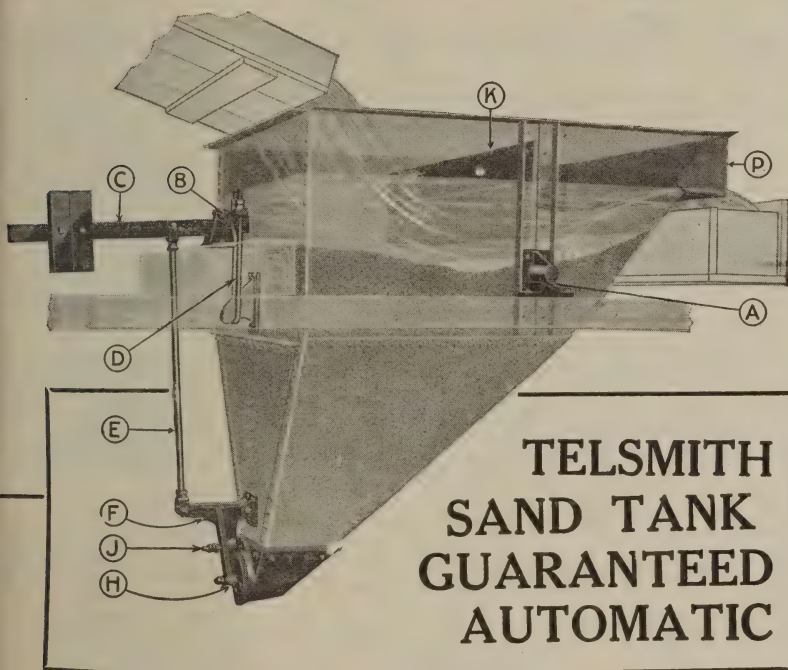
## Godfrey Conveyor Company

ELKHART, INDIANA, U. S. A.

Factory  
Representatives in  
Principal Cities

Branch Offices  
Philadelphia, 736 Drexel Bldg.  
Pittsburgh, 601 Columbia Bank Bldg.





## TELSMITH SAND TANK GUARANTEED AUTOMATIC

The Tel Smith Sand Tank and its counter-weight-arm are both carried on knife-edge bearings, with a wide range of adjustment. As the tank pivots one way, the valve plate pivots in the **OPPOSITE DIRECTION**, giving ample discharge area with a short, snappy valve action. The swing of both members is limited by an adjustable stop, so that the sand is discharged in **SMALL QUANTITIES** but at **FREQUENT INTERVALS**, assuring a deep sand-bed and a dry product.

This tank is guaranteed to work automatically and reliably, with only ordinary inspection service. Here's a chance to cut your pay-roll by one man. Send for bulletin No. S-T-15.

**SMITH ENGINEERING WORKS**  
3183 LOCUST ST., MILWAUKEE, WIS.

# Free Service to our readers

For the convenience of readers who are in the market for equipment, our "Free Service" department will furnish on request any information, catalogs and prices on any machinery, equipment or supplies used in pits and quarries. The coupon below makes it easy for you. Simply check, sign and mail.

**Pit & Quarry, Rand McNally Bldg.,**

**Chicago, Ill.**

Pit and Quarry, Research Department,  
Rand McNally Bldg., Chicago, Ill.

WE ARE IN THE MARKET for the items checked below, and would be glad to receive catalogs, prices or other information.

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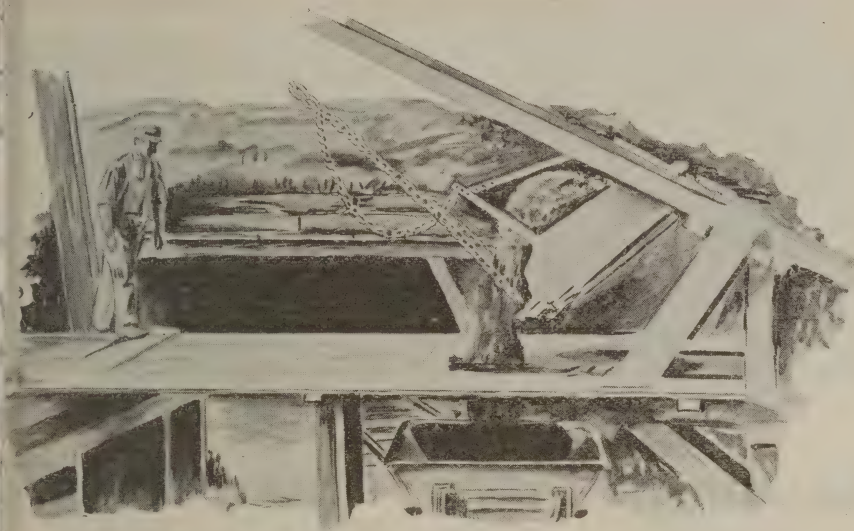
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## Why the Cleveland Builders Supply and Brick Company use Schofield-Burkett Excavators

□ The company had a 65-ft. bank of material that required working in terraces when using shovels—a method that proved costly and inefficient.

A Schofield Burkett excavator was installed and immediately cost began to decline and production to increase.

This is but one of the many various types of excavating problems that Schofield Burkett excavators have solved. If you have a stripping or excavating problem consult our engineering department and make them prove to you what Schofield Burkett excavators can do under such conditions. Write today.

## Schofield-Burkett Construction Co.

Macon, Georgia

A. J. ALSDORF CORPORATION  
404 So. Wells Street, Chicago

*Representatives in Illinois, Michigan and Indiana and exclusive Foreign Distributors*



This Shows a Sauerman "Crescent" Scraper Just After It Had Been Installed to Replace a Clamshell Digger at a New York Plant Where It Greatly Increased the Output

## Sauerman Power Drag Scrapers

**Combine Large Capacity With Small Power Requirements—First Cost is Relatively Low**

Hundreds of small gravel plants have increased their outputs and reduced operating expenses in recent years by installing Sauerman Power Drag Scrapers in place of team scrapers, wagon loaders, portable conveyors and various excavating and loading contrivances. An inexpensive Sauerman scraper becomes a big money-maker in the hands of an ambitious owner of a small gravel deposit.

For getting the most income from a larger gravel bank, the popular combination is a washing and screening plant with a capacity of 300 to 400 cu. yds. per day and a  $\frac{3}{4}$  cu. yd. or 1 cu. yd. Sauerman Scraper. The low cost of production attained with such an installation is astonishing.

As to larger operations, there are a number of plants producing 1,000 cu. yds. and upwards per day with large size Sauerman Scrapers that show real low cost records in excavating and conveying their sand and gravel.

Our new Pamphlet No. 20 containing 32 pages of illustrations, diagrams and concise information will be mailed to anybody interested, upon request.

**SAUERMAN BROS., 434 S. Clinton St., Chicago**



At This Elaborate Plant on the Hudson River a Sauerman Power Drag Scraper Excavates Gravel from a Hill 150 Feet High





## Green Power Drag Scraper

At plant of Albany Gravel Company, Albany, New York, where hard packed material makes it absolutely necessary to have a Scraper that will stand up under hard work.

Another user in the same territory writes as follows:

Fulton, N. Y., Aug. 9, 1923

"The Drag Scraper outfit we purchased from you has more than doubled the capacity of our plant and cut the excavating cost more than half. We believe it safe to say that we have saved thousands of dollars if we had put this outfit in three years ago.

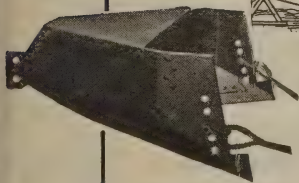
(Signed) Fulton Sand & Gravel Co.  
By S. D. Wells."

Write for location of Scraper Plant nearest to you, so you can see for yourself.

**L.P. GREEN**  
Power Drag Scrapers



909 Lumber Exchange, Chicago, Ill.





*These Self-Dumpers—10 of a fleet of 25 purchased by the Indiana State Highway Commission—are building a 10 mile section of the state road between Huntingburg and Dale, Ind.*

## WOOD SELF-DUMPER

### For FORD One Ton Trucks

Since the earliest years of the truck industry Wood-Detroit Hydraulic Hoists and Steel Bodies have been the standard dumping equipment—the choice of over 90% of the truck builders.

There has lately grown up a further demand from dump truck users—a call for a light, low-priced, yet sturdy dump body suitable for use on Ford and other low-priced, speedy trucks.

This need is best met by the Wood *Self-Dumper*. Made entirely of steel—operated by gravity—requiring no hoist—quick acting—serviceable—and its cost is surprisingly low.

The dual-pivot hinge prevents the smashing, racking action that has heretofore made gravity-operated bodies impractical.

We shall be glad to send illustrated descriptive folder on request.

Complete  
ready to install

**\$140**

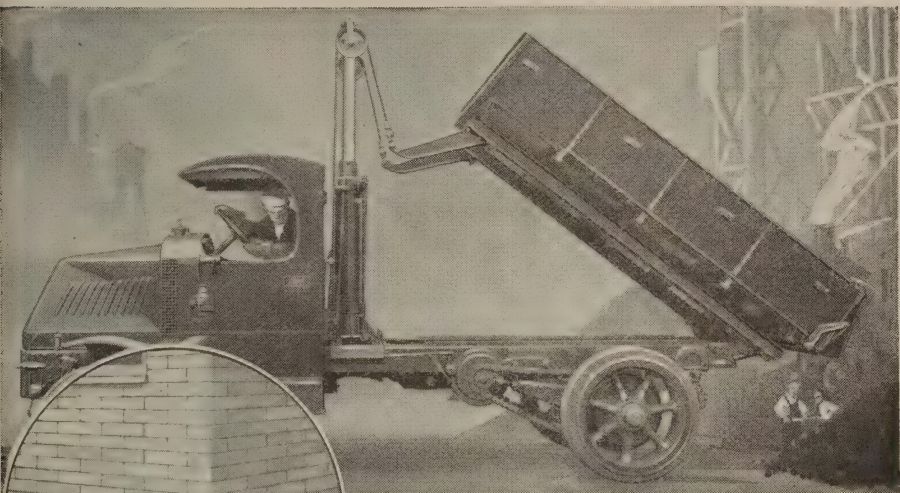
F. O. B. Detroit  
Tax Extra

**Wood Hydraulic Hoist & Body Co.**  
7924 Riopelle Street      Detroit, Michigan

*Sales and Service in Principal Cities*

*Built by "Gar" Wood*





## The Powerful Lift of the Screw-Jack!

THE screw-jack principle is one of the most powerful lifts known to engineering. Huge buildings weighing thousands of tons have been raised by jack-screws.

It is the Screw-jack principle which is used in the Van Dorn Vertical Mechanical Truck Hoist. The heaviest load can be dumped in 20 seconds at moderate speed of the motor. The hoist is always positive in control—no weather troubles—it operates as surely and speedily in mid-winter as in mid-summer. It is self-lubricating, requires scarcely any attention, and stands up under long, hard usage.

The Van Dorn Mechanical Hoist marks a big advance in truck dumping. Truck operators who wish the greatest efficiency from their trucks should know Van Dorn Hoists and what they will do. Put a Van Dorn Hoist on the next truck you buy, and let a comparison with former dumping methods prove its many big advantages.

Send for complete catalog describing Van Dorn Mechanical Hoists, Vertical and Horizontal type, and Dump Bodies for all purposes.

**THE VAN DORN IRON WORKS COMPANY**  
Cleveland, Ohio

#### BRANCHES:

Chicago  
Boston  
Long Island  
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# Van Dorn

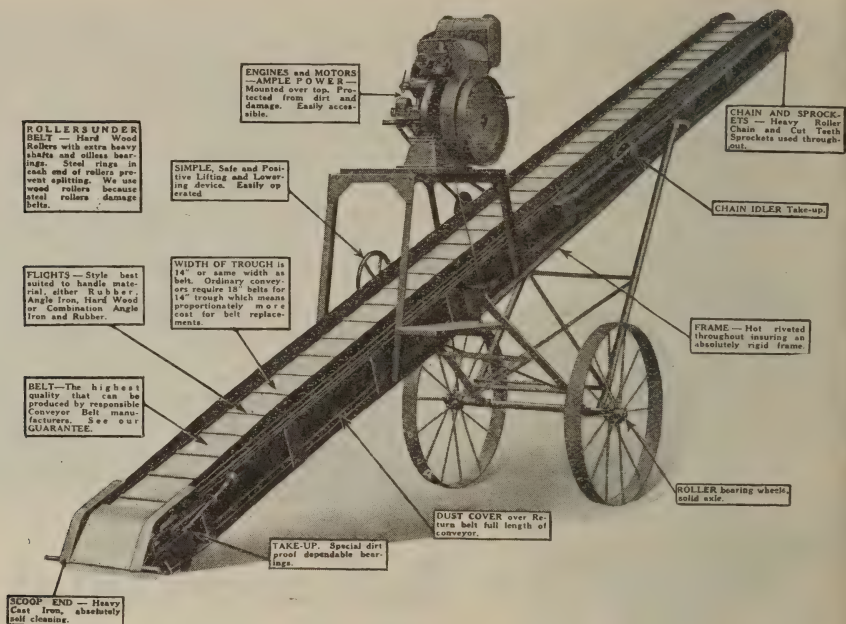
**MECHANICAL DUMP TRUCK HOISTS  
BODIES - FRAMES - PRESSED PARTS**

#### BRANCHES:

Philadelphia  
Washington  
Providence

**BETTER, FASTER TRUCK DUMPING**





## Designed Especially for Handling Sand, Gravel, Stone, Etc.

Owners of the Contractors Type Scoop Conveyor strongly approve of this perfected machine.

They are particularly enthusiastic about its low maintenance cost and its dependability when pushed to the limit of its  $1\frac{1}{2}$  ton per minute capacity.

The Contractors Type Scoop Conveyor is the result of many years of experience in the design, construction, installation and maintenance of thousands of Portable Belt Conveyors.

Read over the features of this machine as outlined above and—

*Write for Catalog No. 163*

**Portable Machinery Co.**  
**PASSAIC, N. J.**



# **THE SCOOP CONVEYOR**





TRUCK LOADERS



PORTABLE BELT CONVEYORS

# Truck Loading Logic

*If a Haiss Loader will do more work at lower cost, it stands to reason that you ought to figure your estimate on the low-cost-of-Haiss Loading basis—and bid in the work at a longer profit!*

A Haiss Creeper Loader is a profit-maker for the man who owns it. It not only loads fast, but what is more important keeps loading—always on the job, always working full capacity. Only a loader that is designed and built right will stand the gaff of contracting work.

A Haiss Loader is huskier than others; that's why it outperforms anything but a steam shovel. Take the transmission, for instance; Haiss builds a Haiss designed transmission, because an ordinary commercial transmission wasn't as strong as the Haiss Engineers knew it ought to be, for this service. You engineers will begin to understand why Haiss performance is better when you have opportunity to sit down and make analytical comparisons. Contrast the strength of a transmission pinion with 4-inch face, with one just a bit more than half as wide.

The best test is to watch Haiss Loaders work or, if you can't do that, let us tell you who uses them—and find out what others think. For the work it will do, a Haiss Creeper Loader is the cheapest truck loading unit you can own.

*Bulletin 521 describes it*

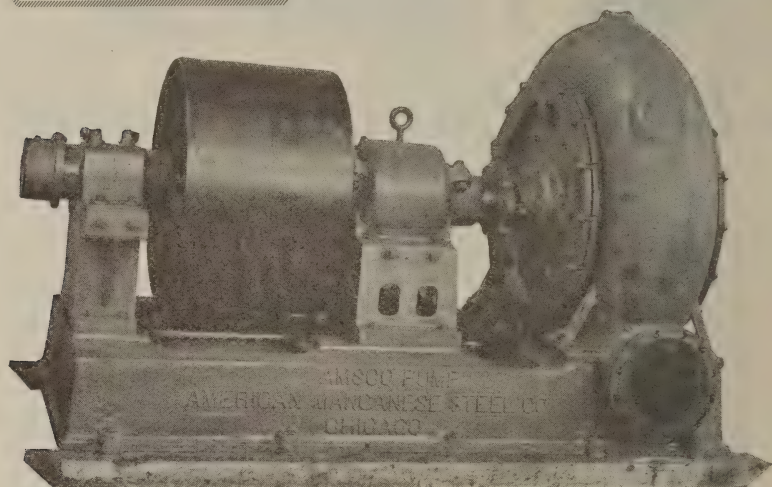
**The George Haiss  
Mfg. Co., Inc.**

142nd St. & Rider  
Ave.

New York

Representatives  
Throughout the  
World



**AMSCO**

## Dollar for Dollar Value

Taking into consideration not only first cost but repairs, replacements, length of service and general efficiency, Amsco manganese steel pumps offer you dollar for dollar value that is unsurpassed.

That is why so many operators who realize that true pumping economy lies deeper than price, have chosen Amsco Pumps.

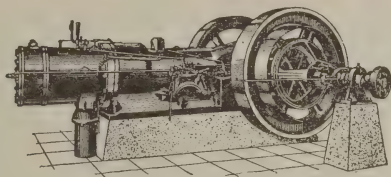
We will appreciate the opportunity of supporting these statements by records. Write for them today.

**AMERICAN MANGANESE STEEL CO.**

General Sales Offices: 389 E. Fourteenth St., Chicago Heights, Ill.  
PLANTS: CHICAGO HEIGHTS, ILL.; NEWCASTLE, DEL.; OAKLAND, CAL.

See P&Q HANDBOOK Page 291



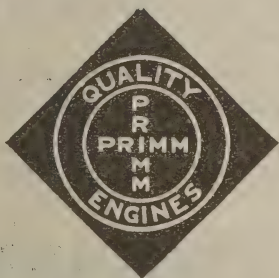


**20 to 300 H. P.**

**Single and Twin Cylinder Models**

**PRIMM OIL ENGINES**  
**are ideal for Sand and Gravel Plants**  
**because:--**

- 1. They are completely enclosed--dustproof.**
- 2. They are simple, rugged and economical.**
- 3. They operate automatically under fluctuating loads.**
- 4. They are slow speed--built for continuous, heavy duty service.**



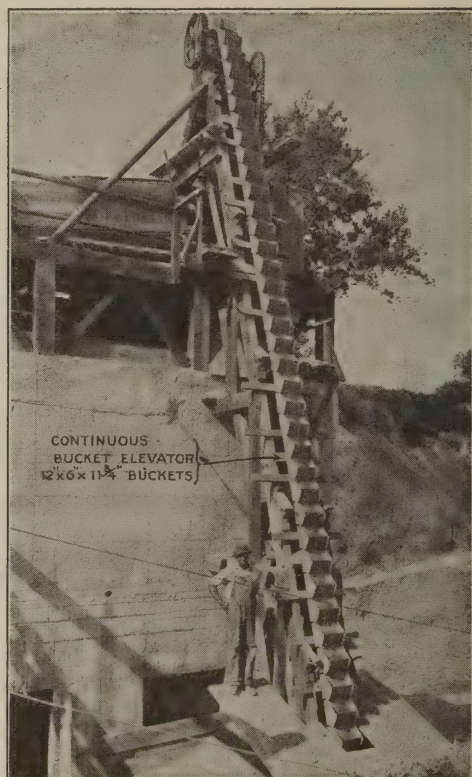
**The Power Mfg. Co.**

**706 Cheney Ave.**

**Marion, Ohio**

**Since 1902**

*Bulletin No. 90 sent upon request*



## Webster Continuous Bucket Elevators

are used primarily for handling sand, gravel, stone, lime, etc., and are built in many different lengths and capacities to suit the requirements of the individual plants.

They are built of either steel or timber construction with malleable iron or steel buckets mounted on single or double strand of chain or on elevator belts.

Let our Engineers help you in the selection of proper equipment.

### THE WEBSTER MFG. COMPANY

#### 4500-4560 CORTLAND ST., CHICAGO

Factories - Tiffin, O. Michigan City, Ind. and Chicago - Sales Offices in Principal Cities



# Pit and Quarry

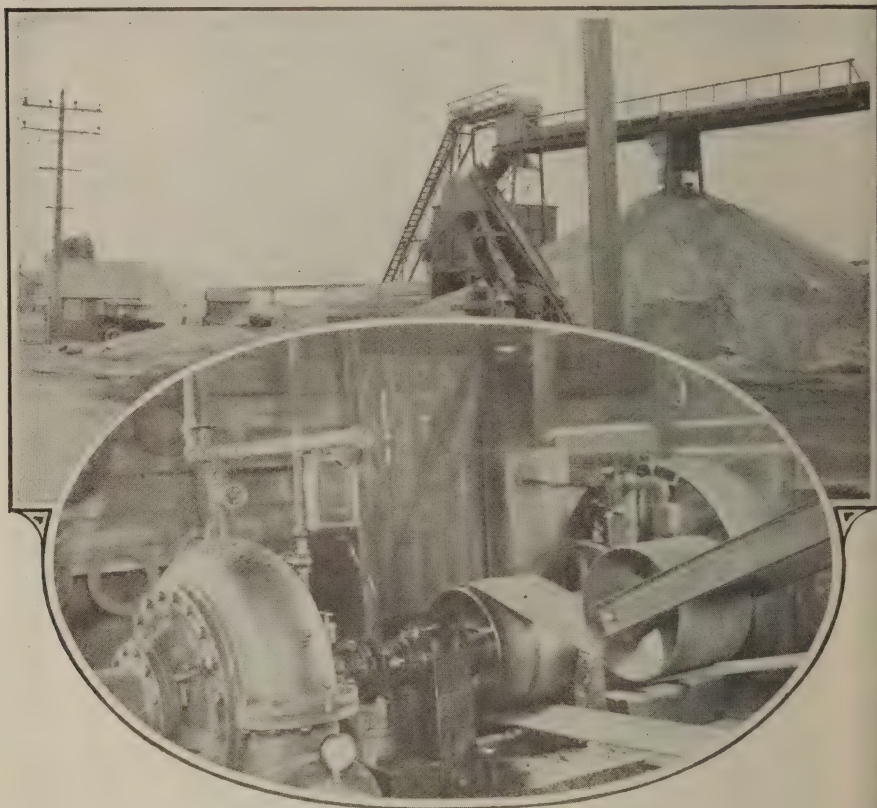
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## A Small Pump But a Big Profit Maker

A few miles west of Evanston, Illinois, an active little gravel plant lies right along side of the highway. There isn't a great amount of equipment and, as gravel plants go, the investment wasn't large.

At this plant production centers around a Morris seven inch pump. The material pumped from the pit is elevated 60 feet and screened to

four sizes. It is significant that with this one seven inch Morris pump the Foley plant produces as much material per day as many larger plants using other methods of excavation.

We can give you many other instances where Morris pumps are giving maximum production at minimum costs. And your requests for information will get an immediate reply.

See **P&Q** **HAND BOOK** Pages 293-294-295

### MORRIS MACHINE WORKS

BALDWINVILLE, N. Y.

*Representatives in Principal Cities*

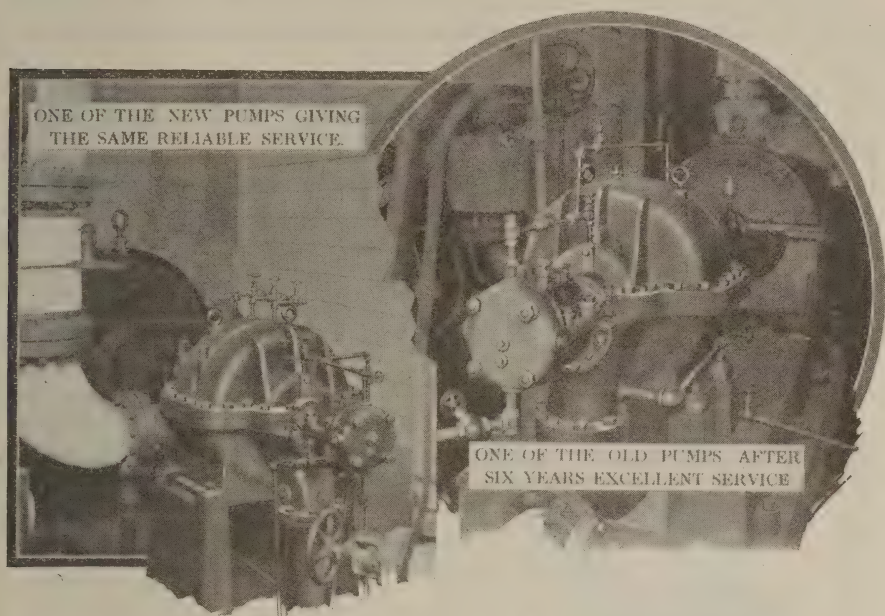
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## Cameron Pumps On Boiler Feed Service

*The American Railway Company writes—*

"We have installed at our Brandywine Plant of the Wilmington and Philadelphia Traction Company, Wilmington, Del., three of your steam turbine driven Centrifugal Boiler Feed Pumps, which have been in constant use for six years. These pumps have given excellent service.

"We have also lately purchased two more of the same type pumps, one of which we now have installed and have had in use for some little time. These latter pumps are of the same type as the old pumps, and have a capacity of 850 G.P.M. and 250 pounds working pressure. From all indications it appears that they will give us fully as good service as the old pumps."

**Satisfied Cameron users are found  
in every conceivable industry.**

*Let us send you a complete set of bulletins.*

**INGERSOLL-RAND CO., 11 BROADWAY,  
NEW YORK**

*Offices in all principal domestic and foreign cities*

# Ingersoll-Rand

169D

A. S. CAMERON STEAM PUMP WORKS

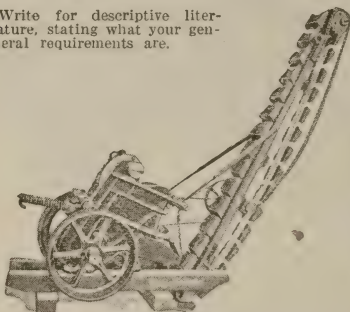
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## INSPECTION—TESTS—CONSULTATION

INSPECTION OF NEW AND SECOND HAND CARS, LOCOMOTIVES, CRANES, DREDGES, STEAM SHOVELS, PUMPS, ENGINES AND ALL CLASSES OF QUARRY EQUIPMENT.

NEW YORK PITTSBURGH **CHICAGO** ST. LOUIS SAN FRANCISCO

Write for descriptive literature, stating what your general requirements are.



### *New Holland* **ROCK CRUSHER**

Excellent for crushing oversize rock into fine grades. Will take the oversize output of a larger crusher and reduce it to smaller sizes that bring a higher price. A New Holland Crusher is inexpensive and will increase your profits from crushed rock.

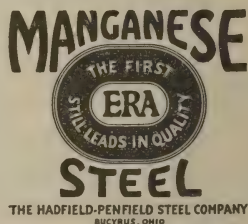
New Holland Rock Crushers are made in sizes to handle 5 to 15 tons per hour, requiring 5 to 12 h.p. to operate.

**NEW HOLLAND MACHINE CO.**  
New Holland, Pa., U. S. A.

## MANGANESE STEEL PARTS

If you use it why not the best?  
Prompt response to inquiries for Hadfield's "Era" brand Manganese Steel.

**The Hadfield-Penfield Steel Company**  
BUCYRUS, OHIO



## Gade Turntable Dragline

50' boom. 1 yd. bucket. Full swing, self propelling excavator for stripping, digging, loading, etc. One man operation. Priced right.

**C. L. Gade Excavator Works**  
Box 435 Iowa Falls, Iowa  
MANUFACTURERS FOR 23 YEARS



# E. C. A. REBUILT EQUIPMENT GUARANTEED

*All the Equipment listed below is owned by us and may be inspected at one of our own warehouses*

## CRANES

- 2—Byers Auto Cranes. One on caterpillar; 1 on traction wheels, with 30 ft. boom, with  $\frac{1}{2}$  or  $\frac{3}{4}$ -yd. clam shell buckets.
- 1—15-ton, 8-wheel, O. & S., 40-ft. boom.
- 1—15-ton Browning locomotive crane on 4-wheel, standard gauge trucks, with 40-ft. boom and bucket operating.

## CRUSHERS

- 1—No. 4 Austin Gyratory crusher.
- 1—10x20 Climax Jaw Crusher on Wheels.

## AIR COMPRESSORS

- 1—Sullivan Class W.G.3, belt driven cylinder, 10x12.
- 2—10  $\frac{1}{2}$ " Type C Westinghouse Steam Compound, Cap. 150 ft. at 100 lbs. Requires 25 H. P.

## GASOLINE HOISTS

- 6—Single and double drum, with 6, 10 and 15 h.p. gas engines.

## GUY DERRICKS

- 1—Wooden Guy Derrick mast 60 ft., boom 56 ft., 16x16 timbers—single line.
- 1—All steel with 70-ft. mast, 60-ft. boom, with all guys, with bull wheel, 10-ft. capacity, bucket operating.

## HOISTING ENGINES

- 20—Three-Drum Hoists, with or without boilers. Sizes, 10x12, 9x10, 8  $\frac{1}{2}$ x10, and 7x10, with separate swingers for derrick work. All makes.
- 40—Two-Drum Hoists, with or without boilers. Sizes, 10x12, 9x10, 8  $\frac{1}{2}$ x10, 7x

- 10. 6  $\frac{1}{4}$ x10, 6x8, and 5x8. Can be equipped with holding drum for bucket work. Several special Cableway Excavators or Drag Scraper Hoists. All makes.
- 12—Single Drum Hoists, 9x10, 6  $\frac{1}{4}$ x10, 8x8. Lidgerwood, American and Lambert.

- 3—Swinging Engines.

- 1—Double Drum Belt Hoist, cap. 6000 lb.
- 1—Double Drum Belt Hoist, cap. 3000 lbs.

## RAIL AND TRACK

- 4—Miles, 24-in. Gauge Portable Track, with steel ties, made up of 20-lb. rail with switches.

## CENTRIFUGAL PUMPS

All sizes from 12-in. suction, 10-in. discharge, down to 2  $\frac{1}{2}$ -in. suction, 2-in. discharge. Belt driven and dir. conn. to steam engines, gas engines and electric motors.

## STEAM LOCOMOTIVES

- 1—Davenport 24-in. gauge, steam, 7-ton.
- 1—Shay, geared, 13-ton, 36-gauge, steam.
- 1—Kopple, 24-in., gauge, 7-ton.

## STEAM SHOVELS

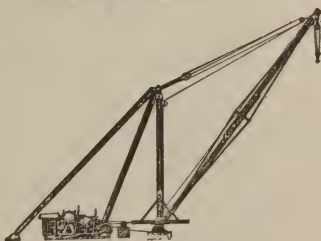
- 1—No. A-1 Thew, Traction Wheels,  $\frac{3}{4}$  yd. dipper.
- 4—Keystones; 3—No. 3 and 1—No. 4.
- 2—Type O Thew, Traction Wheels,  $\frac{5}{8}$  yd. dipper.

## CLAM SHELL BUCKETS

- 28—Clam Shell Buckets. Sizes  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1, 1  $\frac{1}{2}$ , or 2 yd. All makes.

## ELECTRIC HOISTS AND DERRICKS

We have disposed of practically all our electric hoists at Primos but still have a limited number in the same excellent condition, for immediate shipment from Chicago and Pittsburg.



### SPECIFICATIONS OF DERRICKS

Made by American Hoist & Derrick Co. Timbers of Oregon fir, Mast 16"x16"x40 ft. Boom 14"x14"x80 ft. Trussed. Legs 14"x14"x60 ft. with 16 ft. bullwheel. For hook work or will change to bucket operating.

### SPECIFICATIONS OF ELECTRIC HOISTS

Made by American Hoist & Derrick Co. Late Model two drum with attached swinging gear with Otis 37 H.P. A. C. 440 volt, 3 phase, 60 cycle motor—or will change to suit customers current requirements. Can also furnish counterweight holding drum when used for operating clam shell.

We also carry complete line of air compressors, boilers, cars, draglines, dragline buckets, steam hammers, trenching machines, etc.

If you don't see what you need listed write us.

## Equipment Corporation of America

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Pittsburgh

860 Empire Bldg.  
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# WE OWN AND OFFER FOR SALE OR RENT

## STEAM SHOVELS

- 1—Model 28 Marion revolving, Shop No. 3375, traction wheels, standard boom,  $\frac{3}{4}$  yd. dipper.
- 1—Model 18, Osgood, revolving, Shop No. 954, mounted on caterpillar, high lift equipment,  $\frac{3}{4}$ -yd. dipper.
- 1—Model 29 Osgood, revolving, shop No. 1117, mounted on caterpillars, 30 ft. boom, 26 ft. dipper handle,  $\frac{3}{4}$  yd. dipper.
- 1—18 B Bucyrus, revolving, Shop No. 1764, traction wheels, standard boom,  $\frac{3}{4}$  yd. dipper.
- 1—Little Giant, Railway type, standard gauge, equipped with standard boom,  $1\frac{1}{4}$  yd. dipper.
- 1—70-C Bucyrus, standard gauge, railway type, Shop No. 1499,  $2\frac{1}{2}$  yd. dipper.

## LOCOMOTIVES

- 1—Whitcomb, 24-ton, U wheeled connected gasoline switching locomotive, standard gauge, 6 cylinder Minneapolis engine.

## GONDOLA CARS

- 50—80,000 lbs. capacity. Drop door standard gauge. Cars in service. Specifications on request.

## DRAGLINES

- 1—Class 14 Bucyrus, caterpillars, 60 ft. boom, 2-yard bucket.
- 1—Class 24 Bucyrus, steam-operated, Shop No. 772, skids and rollers, 100 ft. boom,  $3\frac{1}{2}$  yd. bucket.
- 1—Class 24 Bucyrus Electric, skids and rollers; 100-ft. boom,  $3\frac{1}{2}$ -yd. bucket.

## TRACTORS AND TRAILER

- 1—10-ton Holt caterpillar tractor.
- 1—120 H. P. Holt Caterpillar Tractor, completely rebuilt at factory.
- 1—5-ton Troy Trailer.

The above list is constantly changing. No matter what your machinery requirements are, write us—we may have it.

**BECK & BABB, 29 So. La Salle Street, Chicago, Ill.**

## GALVANIZED STEEL GUY ROPE

Manufactured by Roebling,  $\frac{7}{8}$ " dia. 6 strands of 7 wires each, with hemp center, approx. strength is 22 tons, weighs 1.20 lbs. per ft. We have about 25,000 ft. which we will sell for 4 cents per ft.

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These drills run from  $2\frac{1}{2}$ " to  $3\frac{3}{4}$ " cyls., and are complete with tripods, weights, throttle valves and oilers, ready to ship. Prices from \$50.00 to \$75.00 each. How many can you use.

## LOCOMOTIVE TYPE BOILERS

- 3—(1) 70 H.P. (1) 80 H.P. and (1) 100 H.P. need minor repairs, will sell very cheaply as they are in our way.

## STATIONARY STEAM ENGINES

- 1—30 H.P. Horizontal L. H. Woodbury-Booth.
- 1—65 H.P. Vertical high speed Westinghouse automatic.

## SHOVEL BOOM AND DIPPERS

- 1— $1\frac{1}{4}$  yd. Thew shovel dipper, good as new.
- 1—1 yd. Marion dipper with 13'8" tunnel boom and dipper stick for a Model 20 shovel.

## CAMERON STEAM PUMP

- 1—No. 11, Regular Pattern Piston pump, 8" suction, 6" discharge.

NOTE: Above items we are desirous of selling quickly and no reasonable offers will be refused.

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NEW YORK, N. Y.





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It would be an injustice to call these blocks second hand as some of them have seen no service. All of them are available for inspection at our yards in Alexandria, Va.

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|------------|------------|
| 4" single  | 4" double  |
| 6" single  | 6" double  |
| 6" triple  | 8" single  |
| 8" snatch  | 8" double  |
| 8" triple  | 10" double |
| 10" triple | 14" snatch |

#### METAL

|            |
|------------|
| 10" single |
| 10" double |
| 14" single |
| 14" double |
| 16" single |
| 16" double |
| 6" snatch  |
| 10" snatch |

*Write for price list and quantity discount*

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**Ford, Bacon & Davis**  
 Incorporated

GENERAL MANAGERS  
 DESK H., ALEXANDRIA, VIRGINIA

**REPAIRED EQUIPMENT****STEAM SHOVELS**

- 2—Type "B" Erie,  $\frac{3}{4}$ -yard, traction wheel, standard booms, shop numbers 206 and 312.
- 1—Type "B" Erie,  $\frac{3}{4}$ -yard, traction wheel, high lift, shop number 914.
- 3—Model 28 Marions,  $\frac{5}{8}$ -yard dipper, traction wheels, shop numbers 3134, 3137 and 3229.
- 4—Model 60 Marion R.R. type,  $2\frac{1}{2}$ -yard dipper, shop numbers 1995, 1999, 2059 and 2372.
- 1—Model 70 Marion R.R. type,  $2\frac{1}{2}$ -yard dipper, shop number 2693.

**LOCOMOTIVES, STANDARD GAUGE**

- 1—18"x24", 55-ton, 6-wheel switcher.

**STANDARD GAUGE DUMP CARS**

- 10—6-yard capacity K. & J. two-way dump.

**36" GAUGE SADDLE TANK LOCOMOTIVES**

- 5—10"x16", H. K. Porter, 18-ton.

Also a large stock of miscellaneous construction machinery, including railroad ditchers and locomotive cranes.

All the above equipment is located at our Pittsburgh shops where inspection can be made.

**H. KLEINHANS COMPANY**

Union Trust Bldg.

Pittsburgh, Pa.

**FOR SALE**

- 5 18-ton, 36" gauge, 4-driver Saddle Tank Locomotives.
- 45 4-yard, 36" gauge, 2-way Dump cars.

**LOCOMOTIVES:** Narrow and standard gauge, 5 to 100 tons. Various types for all classes of service.

- 1  $\frac{5}{8}$ -yd. Marion Model 28 Shovel, built 1917, traction wheels.
- 1  $1\frac{3}{4}$ -yd. Thew Shovel on Railroad Trucks.
- 1 20-ton Browning 8-wheel Locomotive Crane.
- 1 17-ton Industrial 8-wheel Locomotive Crane.

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General Office and plant,  
Atlanta, Ga.

(EST. 1889)

Branches,  
New Orleans, Pittsburgh,  
Seattle



## FOR SALE OR RENT

### STEAM SHOVELS

- 1—Type B Erie, full revolving, high lift boom, traction wheels,  $\frac{3}{4}$ -yd. dipper. Shop No. 1331. New in 1920.
- 1—Model 18 Osgood, full revolving caterpillar type shovel, special high lift boom,  $\frac{3}{4}$ -yd. dipper. Shop No. 954; new in 1921.
- 1—Type O Thew, full revolving, high lift, traction wheels; Shop No. 1777; 2/3 yd. dipper, boom hoist, complete with hoists.
- 1—Model 31 Marion, caterpillar type; Shop No. 4173; new in 1920; 1-yd. dipper.
- 1—Model 36 Marion, full revolving traction shovel, Shop No. 3304, new  $1\frac{1}{2}$ -yd. dipper.
- 2—70C Bucyrus, Shop Nos. 1499 and 1608.  $2\frac{1}{2}$ -yd. dippers.
- 4—70-ton Bucyrus, Shop Nos. 860, 920, 977 and 1223.
- 1—Model 60 Marion. Shop No. 2367.  $2\frac{1}{2}$ -yd. dipper.

### DUMP CARS

- 4—16-yd. std. ga. Western air dump cars.
- 15—12-yd. std. ga. Western air dump cars, 26-ft. beds, box girder doors.
- 13—8-yd. Western, 36-in. gauge, double truck side Dump Cars; steel draw sills, wood beds.
- 4—4-yd. Continental, 36-in. gauge side dump cars, wood beds, steel draw sills.
- 24—4-yd. Western, 36 in. gauge, wood sill, dump cars, truss rod doors.
- 34—4-yd. Continental, 36-in. gauge, wood draw sills, 4 pedestals, truss rod doors.
- 8—3 $\frac{1}{2}$ -yd. Peteler 36-in. gauge side dump cars, wood sills and wood beds.

### STEAM SHOVEL PARTS

- 3—Booms for 70-ton Bucyrus shovels, length 29 ft.
- 1—Boom for 70C Bucyrus shovel, composite, length 40 ft.
- 1—Dipper, Bucyrus,  $2\frac{1}{2}$ -yd. capacity.
- Jack Arms, Dipper Arms and Boom Engines for 70-ton Bucyrus Shovels.
- 1—Bucyrus dipper, 3 cu. yd. cap.

### SPREADER AND DERRICK CARS

- 1—36 in. Gauge Western Spreader Cars.
- 1—36-in. gauge Oliver Spreader Car.
- 1—Std. Gauge Derrick Car.

### CRANES

- 1—10-ton Industrial Crane (Shop No. 1989), 4 wheeled, 40-ft. boom.
- 1—20-ton McMyler, Serial No. 388, built 1912, 8 wheeled; 45-ft. boom, bucket operating drums.
- 1—30-ton capacity Ohio, 8 wheeled, full M.C. B. type, 50-ft. boom, bucket handling drums.
- 1—Pintle Type Crane, built by Variety Iron & Steel Works. New in 1919; 48-ft. boom, 15-ton cap. at 18-ft. radius; 7-ft. 10 $\frac{1}{2}$ -in. gauge, 12-ft. wheelbase, self-propelling. Base of boom 7 ft. above track. Bucket-operating drums. Wt. 50 tons. Price, 25% of new.

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- 1—16 x 22 C. M. & St. P. Ry., Class J-2, 4-wheeled switcher. Weight 32 tons.
- 1—18x24 American, 6-wheeled switcher. Brooks No. 2318. Wt. 55 tons on drivers.
- 1—Std. Gauge, 11x16, American Dinkey; Shop No. 42801; new in 1910. Wt., 20 tons.
- 1—15x24 Porter 4-wheeled side tank Locomotive, Shop No. 5029. Built in 1912. Wt. 46 tons. Steam pressure 180 lbs. Air brakes.
- 1—Standard gauge, 10-in.x16-in. Baldwin dinkey, Shop No. 49090; new in 1918. Butt strap boiler, 160 lb. steam pressure. Wt. 20 tons.
- 1—Standard gauge, 11x16 American 4-wheeled saddle tank Locomotive, shop No. 47421, built 1912. Weight 21 tons, steam brakes, automatic couplers.
- 1—36-in. gauge, 11x16 Vulcan dinkey, Shop No. 1814. Steel cab and butt joint boiler. Wt. 20 tons.
- 1—36-in. gauge, 11x16 Davenport dinkey. Shop No. 710, wt., 20 tons.
- 1—36-in. gauge, 10 x 16 Vulcan Dinkey. Shop No. 868. Wt. 18 tons.
- 1—36-in. gauge, 10 x 16 Porter Dinkey, Shop No. 3912. Wt. 18 tons.
- 1—36-in. gauge Baldwin Dinkey, Shop No. 34550; wt. 18 tons.
- 2—24-in. gauge, 7x12 Davenport dinkies. Shop Nos. 1411 and 1531. Wt., 9 tons.
- 1—24-in. gauge, 7x12 Vulcan dinkey, Shop No. 2345. Wt., 9 tons.
- 1—24-in. gauge 6x10 Davenport side tank dinkey, Shop No. 1307. Wt., 7 tons.
- 1—24-in. gauge 5x10 Shay geared, Lima No. 2678. Wt. 12 tons.

### GASOLINE LOCOMOTIVES

- 1—6-ton Plymouth, 24-in. gauge. Type 2, No. 1077.
- 1—6-ton Whitcomb, 24-in. gauge, Type B-60, No. 1259.

### DRAGLINE EXCAVATORS

- 1—Class 14 Bucyrus, Shop No. 2140, mounted on caterpillars, 60-ft. boom, 2-yd. Page bucket.
- 1—Class 24 Bucyrus Dragline Shop No. 772; skids and rollers, 100-ft. boom, 3 $\frac{1}{2}$ -yd. Page bucket.

### MISCELLANEOUS

- 2—80-hp. horiz. bolters, complete with fittings.
- 2—1 $\frac{1}{2}$ -yd. Page Dragline Buckets.
- 11—Mead-Morrison, 1 $\frac{1}{2}$ -yd. clam shell buckets.
- 1—Industrial Steam Pile Driver Hammer, Serial No. 324.
- 1—Pair steel Pile Driver Guides, 42 ft. long, for above hammer.

### HOISTING ENGINES

- 1—7x10, D. C. D. D., Clyde Hoist with Mich. Std. boiler.
- 1—7x10, D.C., D.D. Lambert Hoisting Engine with boiler.
- 1—5x8 D. C., D. D. American Hoist, with boiler.

### STEAM SHOVEL BARGAIN

One Marion Model 21 full revolving shovel mounted on the new Marion rigid type caterpillars,  $\frac{3}{4}$  yard manganese steel front dipper with reversible teeth. Southern Ohio delivery. Shovel only used two weeks since shipment from factory. Ask for our list of steam shovels, locomotives, cars.

### DEMPSSTER EQUIPMENT CO.

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### Oil Engines—Slightly Used

- 2—100 Snow Diesel.
- 1—80 H.P. Venn Severin, used 2 mos.
- 1—15 H.P. Venn Severin, new.
- 1—50 H.P. Worthington.
- 1—25 H.P. Fairbanks Morse "Y."
- 1—15 H.P. Fairbanks Morse, "Y," used 2 mos.
- 1—10 H.P. Fairbanks Morse, "Y."
- 1—40 H.P. Type N. B., Fairbanks Morse.

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**Osgood 18 Rebuilt . . . \$3,500    Thew  $\frac{3}{4}$ -yd. Like New \$4,000**

Steam Shovels—Locomotives—Dump Cars—Locomotive  
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**Marion 28 Rebuilt . . . \$3,750    14-ton Dinkies . . . . . \$1,350**

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Standard gauge, four driver, saddletank locomotive, cylinders 11x16 in., weighing about 20 tons in working order, built by American Locomotive Co., in A-1 rebuilt condition, new flues, tires, etc.

Standard gauge, six driver switcher (0-6-0) locomotive, cylinders 18x24 in., weighing working order about 50 tons, first-class condition, new tires, air automatic firedoor, air bell ringer, etc.

Thew type "O" steam shovel,  $\frac{3}{4}$ -yard dipper, mounted caterpillars, shipper shaft boom, built 1921.

Have other type locomotives, shovels, dump cars, etc.

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Rock Drills, Columns, and Tripods,  
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## LOCOMOTIVE CRANES

Industrial 10-ton, 4-wheel standard gage 40-ft. boom,  $\frac{3}{4}$  yd. clam shell bucket.  
 Browning No. 5, 20-ton, 50-ft. boom, double drum for bucket handling.  
 O & S, 12-ton, M.C.B., 40-ft. boom, equipped with  $\frac{3}{4}$  yd. clam shell bucket.  
 O & S gasoline caterpillar traction, 35-ft. boom,  $\frac{3}{4}$  yd. bucket.  
 O & S, 20-ton, 8-wheel, M.C.B., 45-ft. boom, 2-yd. clamshell bucket, A.S.M.E. boiler.  
 Brownhoist 8-wheel, 50-ft. boom, bucket operating drums.

## DRAGLINES

Erie caterpillar traction, 40-ft. boom, 1 yd. Page bucket.  
 Austin combination steam shovel and dragline, Model 5, caterpillar traction.  
 Marion model, 251, 115 ft. boom,  $3\frac{1}{2}$  yd. bucket.  
 Monighan, 120-ft. boom,  $3\frac{1}{2}$  yd. bucket.  
 Monighan T1 (Walker) gasoline, 50-ft. boom, 1 yd. Page bucket.

## HOISTING ENGINES

Byers traveling derrick, all-steel construction, 14-ft. gage, 3-drum engine, independent swinger, 50-ft. boom.  
 Mundy d. d. hoist.  
 Lambert d. d. hoist.  
 American d. d. hoist.

## CARS

Koppel 20—2-yd V shaped 36 in. gage.  
 Western 18— $1\frac{1}{2}$ -yd., 24 in. gage.

## SHOVELS

Marion model 61,  $2\frac{1}{2}$  yd. dipper, railroad trucks.  
 Bucyrus, 70-ton,  $2\frac{1}{2}$  yd. dipper, railroad trucks.  
 Marion, model 36, 32-ft. boom, 22-ft. dipper stick, 1 yd. dipper, caterpillar traction.  
 Marion model 28, combination crane and steam shovel, traction wheels.  
 Keystone No. 4 ditcher, equipped with skimmer scoop, also regular bucket.  
 Osgood Model 20, caterpillar traction, combination shovel and dragline, 20-ft. shovel boom, 18-ft. dipper stick,  $1\frac{1}{4}$ -yd. dipper, 40-ft. dragline, boom  $1\frac{1}{4}$  Page bucket.  
 Osgood model 18, caterpillar traction, high lift, 20-ft. boom,  $\frac{3}{4}$ -yd. dipper.  
 Erie "B" caterpillar, high lift, with boom hoist, 20-ft. boom, 18-ft. dipper handle,  $\frac{3}{4}$ -yd. dipper. Used 6 months on light work.  
 Erie B, traction wheels,  $\frac{3}{4}$ -yd. dipper.  
 Browning, type No. 8, 38-ft. boom, 22-ft. dipper handle, 1 yd. dipper, mounted on 4 wheels, standard gage, with stability wheels on same shaft. Used 2 months.  
 Marion model 31, on traction wheels, long boom for high loading equipped with  $1\frac{1}{4}$ -yd. dipper.

## LOCOMOTIVES

Schenectady 50-ton, six-wheel switcher, butt strapped boiler, 170 lb. pressure.  
 Vulcan 21-ton, saddle tank, standard gage.  
 Vulcan 11-ton, saddle tank, 36-in. gage.  
 Vulcan 11x16, saddle tank, 36-in. gage.  
 Baldwin 14x22, saddle tank, standard gage.

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1—O & S, 1-yd. clam shell.  
 1—Williams, 2-yd. clam shell.  
 1—Owen, 2-yd. clam shell.  
 1—Page,  $1\frac{1}{4}$ -yd. dragline.

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1—50-ton 6 wheeled Switcher, short wheel base, butt strap boiler.

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500 tons, 85 lb. No. 1 Relays. 400 tons, 85 lb. New Open Hearth.

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| 1 | 30        | Fairbanks-Morse, type BV . . . 1200                             |
| 1 | 30        | Westinghouse, type CW . . . . 865                               |
| 1 | 35        | Fairbanks-Morse, type BV . . . 900                              |
| 1 | 50        | G. E., type I, form M . . . . . 600                             |
| 1 | 60        | Westinghouse, type MW . . . . 680                               |
| 1 | 75        | G. E., type I, form M . . . . . 1800                            |
| 1 | 75        | G. E., type I, form M . . . . . 860                             |
| 1 | 100       | G. E., type I, form M, al. r. . . 720                           |
| 1 | 125       | Westinghouse, rev. field (40 deg.), synchronous motor . . . 900 |
| 1 | 250       | Fairbanks-Morse, slip ring . . . 600                            |
| 2 | 200       | Westinghouse, type CW, slip ring . . . . . 580                  |
| 1 | 250       | Fairbanks-Morse, slip ring . . . 600                            |
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| 3 | Phase, 25 | Cycle Slip Ring Motors, 220 or 440 volts.                       |
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- 1—New Eureka Jaw Crusher—All Steel . . . . . 1200.00
- 1—100 H. P. Firebox Boiler—140 pounds . . . . . 1200.00
- 1—Portable Crusher on trucks. . . 475.00
- 1—24" Holding Drum . . . . . 125.00
- 1—2 Yard Full Circle Dragline. . . 5500.00
- 1—70 C. Bucyrus Shovel—just overhauled . . . . . 8000.00
- 1—35 ton, Standard Gauge Saddle Tank Locomotive . . . . 3500.00

Also have a stock here in Chicago, two 50 ton Jacks, and a lot of New double and triple blocks, five to fifty ton capacity.

Lots of other bargains. Write or wire your needs.

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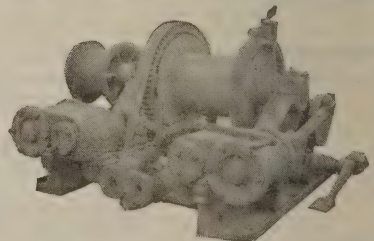
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**Emerson-Brantingham Hoists  
UNUSED**

Double Cylinder, Single Drum,  
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**\$125 Each F.O.B. Chicago**



Capacity 10,000 Pounds

**IMMEDIATE SHIPMENT**

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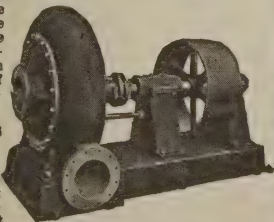
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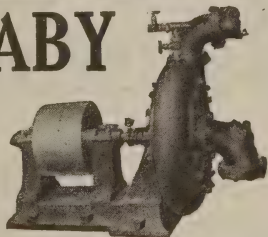
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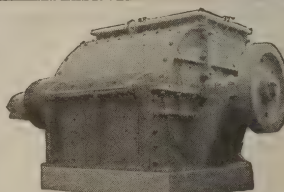
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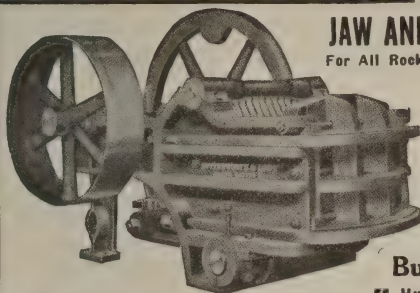
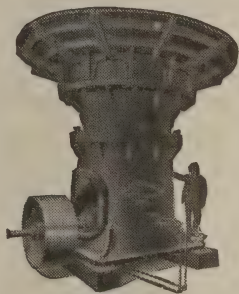
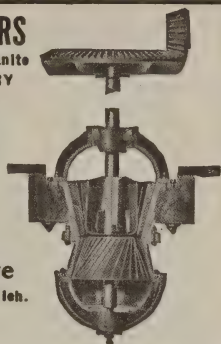
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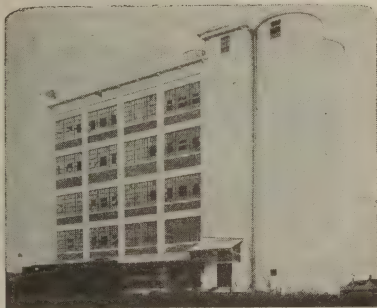
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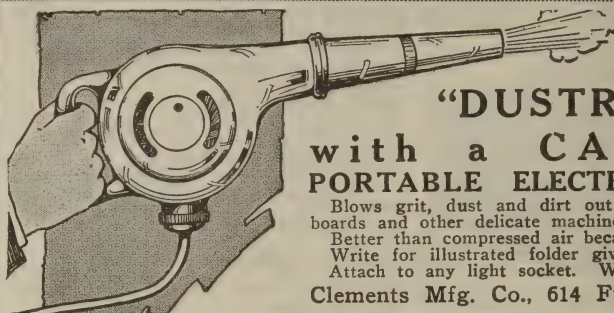
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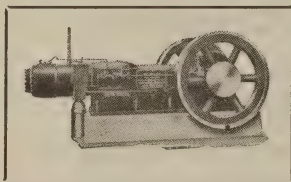
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Cost least for repairs.

Burns low grade fuel.

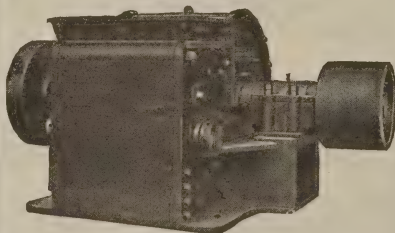
One gallon lubricating oil operates 90 h.p. for 33 hours.

Write for catalogue.

**THE BUCKEYE MACHINE COMPANY**

**Lima, Ohio**

## DIXIE SWING HAMMER CRUSHER

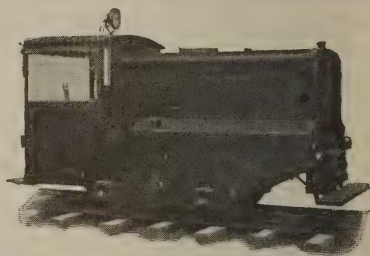


Mogul Crushers will crush rock 14" cubes down to 1½ and finer in one operation, at less cost per ton than does any other hinged hammer crusher.

It is built stronger, it is simple, then why should it not be best? If in doubt, ask a user.

Any size you need, send for full specifications.

**DIXIE MACHINERY MFG. CO.**  
3661 Market St. St. Louis, Mo.



## What our "Eternal Vigilance" means to you

"Eternal Vigilance" is a price we pay for the good reputation of Minster locomotives.

It is "Eternal Vigilance" in manufacturing to maintain the high standards of Minster locomotives.

It is "Eternal Vigilance" over Minsters in operation to discover possible improvements.

And it is this "Eternal Vigilance" that assures you of maximum efficiency with your Minster. If you are not fully acquainted with Minster performance write today for information.

**THE INDUSTRIAL EQUIPMENT  
COMPANY**

410-416 OHIO ST., MINSTER, OHIO  
Eastern & Export Dept., The Herbert Crapster  
Co., Inc., One Madison Ave., New York City



## Specify McCord

### Dependable Force Feed Lubricators

Because wherever positive uniform lubrication is required you will find McCord Dependable Lubricators being used in increasing numbers.

### Dependable in Any Climate

Steam Shovels in Alaska and in South America are today using McCord Dependable Lubricators because they have thoroughly demonstrated their worth over a period of years.

### Economical Lubrication

McCord Dependable Lubricators feed the right amount of oil—at the right place and at the right time. They start and stop with the engine. Large sight feeds in plain view show exactly the amount of oil that is being fed to every point of lubrication.

### Unit Construction Important

The unit construction of McCord Dependable Lubricators enables the dismantling of any section for cleaning or inspection without affecting the operation or feed of any other particular section.

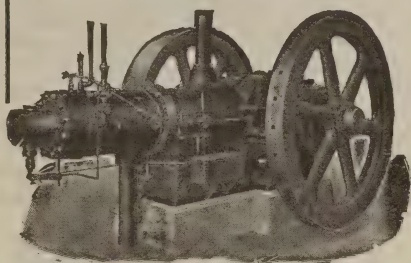
Specify McCord Dependable Lubricators.

*Write for catalog*

**M<sup>c</sup> Cord**  
RADIATOR & MFG. CO.  
LUBRICATOR DIVISION  
DETROIT, MICH.

Manufacturers of McCord Dependable Lubricators, McCord & McKim Gaskets, McCord Automotive Radiators.

**1-<sup>1</sup>/<sub>10</sub> CENTS per  
K. W. HOUR**



TESTS HAVE PROVEN  
that a genuine

### MUNCIE CRUDE OIL ENGINE

will produce power equal to an electric power rate of 1-1/10 cents per K.W. hour; in this figure are included interest, depreciation, taxes, insurance, repairs, upkeep, fuel, lubricating oil and labor.

To compare with this figure, power companies would be required to furnish power at the above rate, and present you with the motors, etc., gratis, as well as assume all up-keep expense.

**MAKE YOUR POWER  
PROBLEMS OUR BUSINESS.**

**NO OBLIGATION.**

Write us fully for information, catalogues, specifications. Operating data sent promptly upon request.

OUR ENGINEERS AT YOUR  
SERVICE

**MUNCIE OIL ENGINE CO.**  
MUNCIE, INDIANA

## A KILN FOR EACH OPERATION

York kilns, developed along sound and proven engineering principles, give a high thermal efficiency with low fuel consumption.

We have a working arrangement with the foremost lime and hydrating engineer in the country. This, plus our wide practical experience, skill and technical qualifications, enables us to render you unusual service.

### McGANN MANUFACTURING COMPANY, INC.

332 S. Michigan Ave.  
Chicago

Works: York, Pa.

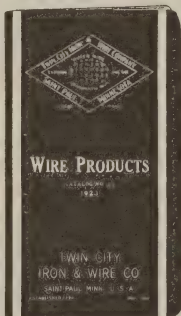
50 Church St.  
New York

## LOCOMOTIVES



### Rod or Geared

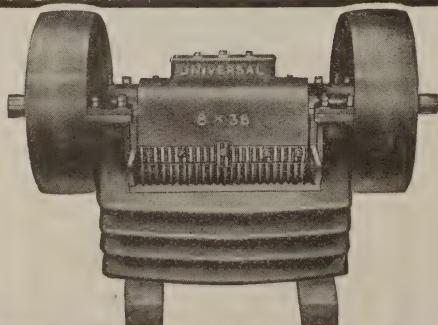
Davenport Locomotive Works  
Davenport, Iowa



## QUALITY — THE FIRST CONSIDERATION — SERVICE

Uniform Double Crimped sand, gravel, coal and potato screens, heavy screens for crushed stone or for any purpose whatsoever—made from any desired wire material in any style and size of mesh. "Everwearing" Spring Steel Screens are practically indestructible. Any special mesh manufactured to fill your exact requirements. A large stock of galvanized wire cloth and fine mesh in steel, copper or brass always on hand. Anything in the line of wire. Our prices are right. Send for circular.

TWIN CITY IRON AND WIRE COMPANY  
St. Paul, Minn.



### "THE BEST MADE"

said a sand and gravel pit operator who has been using

#### UNIVERSAL CRUSHERS

for nearly ten years. He has just installed two of our new steel crushers.

25 sizes. A crusher for every purpose. Write for circulars.

UNIVERSAL CRUSHER  
COMPANY

200 3rd St. Cedar Rapids, Iowa





### Chew off big bucket loads

The Blaw-Knox DREADNAUGHT has well shaped digging scoops—with tremendous lever arm powder behind them for forcing through packed broken stone, bank gravel, clay and other hard packed materials—heaping up big loads in any material which can be “clammed” at all.

Built by master builders to stand the gaff of hard continuous digging—a Blaw-Knox Dreadnaught Bucket lasts. Rope wear and bucket wear are reduced to a minimum.

**BLAW-KNOX COMPANY**  
652 Farmer's Bank Bldg.  
Pittsburgh, Pa.

# BLAW-KNOX BUCKETS



### Greater Wearing Qualities

mean fewer renewals and less repairing on your dippers, protecting you not only from repair costs but also loss of time.

Amsco Manganese Steel Missabe dippers are not only made of the greatest wear resisting metal known, but are also designed upon the best engineering principles. With an Amsco dipper you are assured of both long service and efficient work.

We would like to send you a catalogue describing Amsco Missabe dippers. Write for it to-day.

**AMSCO**

**American Manganese  
Steel Company**

General Sales Offices: 389 East 14th St.  
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PLANTS: CHICAGO HEIGHTS, ILL., NEW  
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## Mr. Pit Operator

This low priced, full revolving, caterpillar type machine, equipped with clam shell or dipper that fits the small job. Simple in design, travels in any direction, easy to operate.

*Write for catalogue*

**MICHIGAN  
DREDGE CO.**

Bay City

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**"Carroll" Solid Weld  
Steam Shovel Chain**

*Perfect Workmanship  
Dependable Service*

**The Carroll Chain Co.  
COLUMBUS, OHIO**

## DAKE SWINGING ENGINES PRODUCE

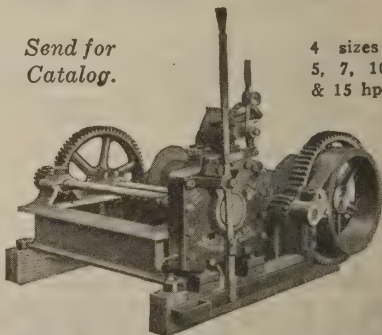
**Quicker Swings  
More Work**

**Less Trouble**

The experience of use has proven them—That's why they are so universally used on bull wheel derricks.

*Send for  
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4 sizes:  
5, 7, 10  
& 15 hp.



**DAKE ENGINE COMPANY**  
Grand Haven, Mich., U. S. A.



# MEAD-MORRISON



## UNIVERSAL GRAB TYPE "W"

### A Bucketful Every 40 Seconds

This 1½-yard Mead-Morrison Type "W" bucket replaced an orange-peel dredging in hard-packed blue clay. It moved 640 yards of clay in a 6½ hour working day, and maintained an average of a trip every 40 seconds for hours.

Achievements like this point the way to real economy on any dredging, digging, or rehandling job. Get more loads per day—more pounds per load, with a Mead-Morrison Type "W".

### MEAD-MORRISON MANUFACTURING COMPANY

928 Prescott Street, East Boston, Mass.

Welland, Canada

#### BRANCH OFFICES:

New York      Montreal      Chicago



## "CAR PULLERS"

Why the Delay in the moving of your cars, when a Car Puller of our Improved Type is always on the job, for handling heavy hauls around your yard, in the Spotting of Cars in either direction?

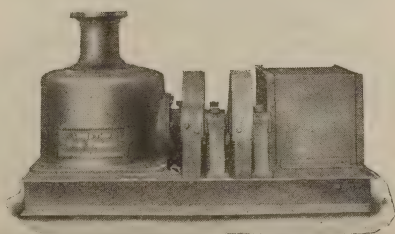
Can be furnished in either the 7½-10-15 and 20 H.P. size, to meet any operating condition in either the Motor or Belt Driven construction.

Complete information is contained in our New Car Puller Bulletin.

**Write today for your copy**

### Mining Machine Company

Mountville, Pa.



# ATLAS

EXPLOSIVES

## for quarrying



**A**LTHOUGH large quantities of Atlas Ammite are used because it will not freeze under any condition, this Atlas product is more than a winter explosive. It is an all-year-round standby with quarry men—an explosive that is equally efficient, powerful and economical at any season of the year. Furthermore, Atlas Ammite will not cause headaches even when handled in enormous quantities. It keeps indefinitely under proper storage conditions—age has no harmful effect upon it. Let the Atlas Service Man show you how Ammite can be made to cut blasting costs on your work. Write nearest branch.

### A M M I T E

—the all-year-round explosive—

**ATLAS POWDER COMPANY**  
WILMINGTON, DELAWARE

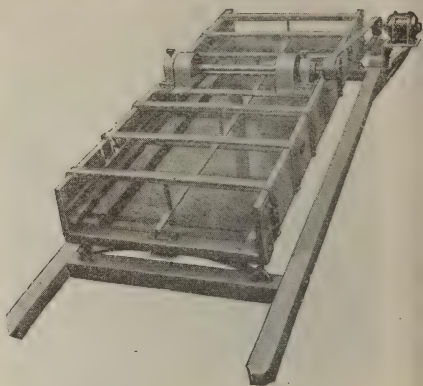
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## What is your idea of a good screen?

Isn't it the same as that of the Virginian Limestone Corp'n—the utilization of the most efficient screening motion, economy, durability and greatest capacity per screening area.

During two years of continuous service for this company, **UNIVERSAL VIBRATING SCREENS** have filled every requirement and proved very satisfactory.

They will do the same for you.

Write today for booklet describing **UNIVERSAL VIBRATING SCREENS**.

Screens are furnished with or without motor.

## Universal Vibrating Screen Co.

1530 Packard Ave.

**RACINE, WISCONSIN**

See P&Q HANDBOOK Page 211





# NELSON FORDSON LOADER

The ONLY Fordson Loader that  
CROWDS WHILE ELEVATING.

(Patent Applied For)



## NOTE THESE ATTRACTIVE POINTS:

Operator stands at one side,  
with clear view of all operations.

Cuts a wide, level path, at any  
grade desired.

Swivel spout permits side or  
end loading of trucks.

## Collapsible Elevator

**N. P. NELSON IRON  
WORKS, INC.**

210 40th ST., BROOKLYN,  
NEW YORK.

## ONE MAN

## *Could do this job*

Provide any one of these three laborers with a Special Fordson Loader and he will load more trucks per day, with less labor on his part, and do the work at a much lower cost.

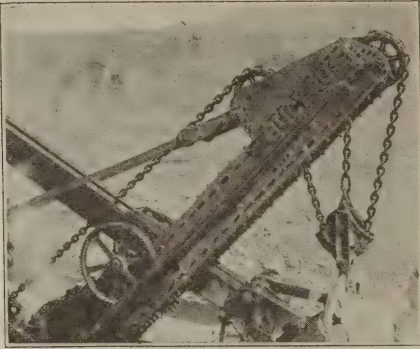
One plant tried this plan and the result was a 75% reduction in loading costs.

You will want details, of course. Write today for them or consult any Ford dealer.

## SPECIALTY ENGINEERING COMPANY

ALLEGHENY AND TRENTON  
AVES.  
PHILADELPHIA, PA.





## Survival of the Fittest

Just as the ancient Spartans pruned out the unfit from their nation we discard any material that does not meet the rigid requirements necessary in maintaining the high standard of Taylor Mesaba Steam Shovel Chain.

This special attention to the raw materials used is your protection against inferior service. And Taylor Mesaba Steam Shovel Chain has proved its ability to give maximum chain service so convincingly that hundreds of operators will specify no other.

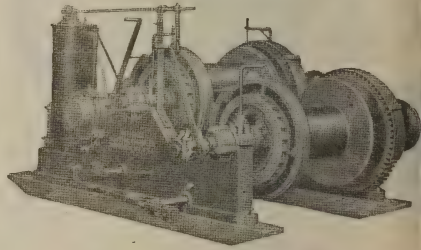
You too will continue to specify Taylor Mesaba after having used it. Specify it on your next order.

**TAYLOR**  
MESABA

**S. G. Taylor Chain Company**

138 SO. DEARBORN ST.  
CHICAGO, ILL.

## What is the cause of most inefficiency?



Investigation has shown that the largest percentage of inefficiency is caused by inferior equipment and methods.

Where hoists are used the remedy lies in a "National" Hoist. National Hoists are not only made of the highest grade of material but have incorporated in their design nine special features particularly designed to meet severe quarry and plant service.

The toll of inefficiency is so great and hoists play such an important part in production at many plants that it will pay to seek improvements by investigating National Hoists.

Write for information today.

**The National Hoisting  
Engine Company**

Harrison, N. J.

**N A T I O N A L**



# SALEM

Genuine

## Elevator Buckets

Since 1880, when Salem Buckets were awarded First Premium for superiority, no other make of bucket has approached the Salem, in quality, long wear or unusual service.

Write for Catalog No. 3625

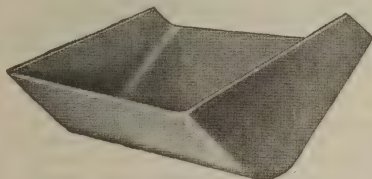


Fig. 132. Round Heel Shelf Bucket for handling damp materials which will not discharge readily from other styles of buckets.

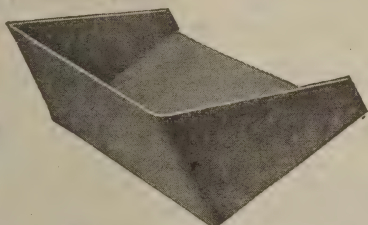


Fig. 131. Square Heel Shelf Bucket same as Fig. 132, with the exception of the heel.



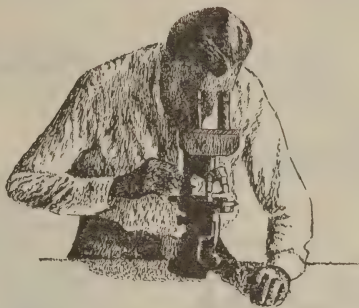
Fig. 1076. Flat Bottom Open End Shelf Bucket for handling wet, sticky substances which will not discharge readily from other styles of buckets.

**MULLINS BODY CORPORATION**

Successors to W. J. CLARK CO.

106 Mill St.

Salem, Ohio

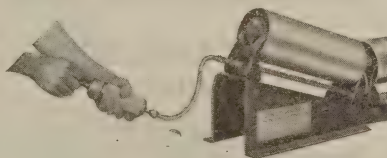


## No Microscope is required to find the superior features of Mellin Belt Conveyor Idlers

The Mellin Belt Conveyor Idler was designed to provide an idler forming a perfect trough, minimum weight of rotating parts, correct lubrication, low frictional resistance, great strength, automatic alignment, simplicity, interchangeability and least number of parts.

The lubrication feature is especially efficient, being positive high pressure through individual pipes. Under continuous service bearings need lubrication but once a year.

It is these features that enable Mellin Belt Conveyors to give more efficient service, last longer and, in the end, cost less. Of course, you will want records and details. Write for them today.



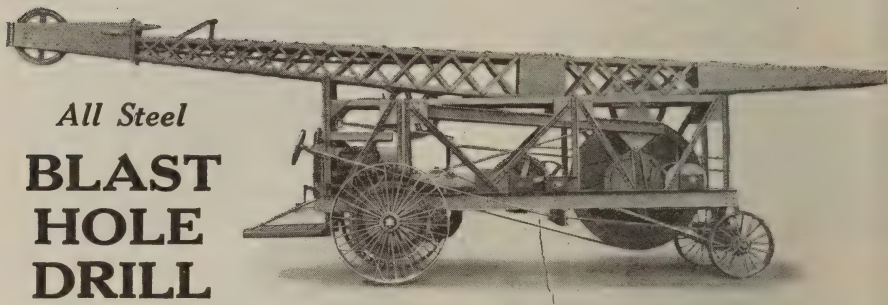
## CHILLINGWORTH ENGINEERING CORP.

143 Liberty Street  
NEW YORK CITY

# The ARMSTRONG

*All Steel*

## BLAST HOLE DRILL



has a clutch that works. It takes hold when you start the machine in the morning and it holds till you quit at night. It does its part every hour in the day every day in the year. And IT IS GUARANTEED AGAINST BREAKAGE FROM ANY CAUSE DURING THE LIFE OF THE MACHINE and that is a long time because the machine is All Steel. It ends clutch troubles. No breaks to delay your work—no idle time from clutch troubles. It is the greatest boon to operators that was ever put on a drilling rig. Write for our complete catalog. It's FREE. Write today.

**Armstrong Manufacturing Company**  
306 Chestnut St., Waterloo, Iowa, U. S. A.

### PACE SETTING IN BIG BLAST HOLE DRILLING

SINCE the very beginning of the use of well drills for quarrying and heavy rock excavation, Cyclone No. 14 Drills have been the standard by which drill performance and results have been measured.

For those who do not have the time or inclination to go into details, there is absolute protection in the Cyclone iron-clad operating guarantee. Ask about it.

Those who wish to investigate carefully and make their own decisions will find complete data on Big Blast Hole drilling and a detailed illustrated description of Cyclone No. 14 Drills in our 100-page Catalog B-45.

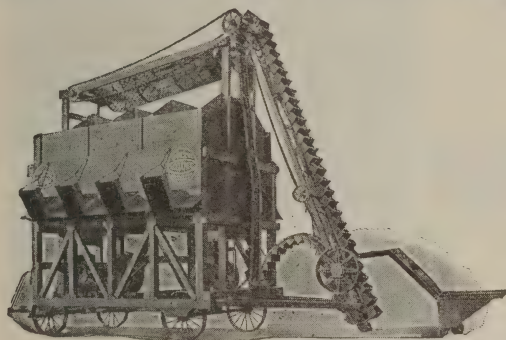
**THE SANDERSON-CYCLONE DRILL CO.**  
**ORRVILLE, OHIO**

Eastern and Export Office,  
30 Church St., New York.





# RELIANCE PORTABLE SAND AND GRAVEL



## SCREENING PLANT

will handle and screen  
25 to 30 tons per hour  
—will save its cost in  
six months.

We also offer station-  
ary plants from 100 to  
1,500 tons daily capac-  
ity.

COMPLETE CRUSHING,  
SCREENING AND WASHING PLANTS

Write for catalogue and prices

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KINGSTON, N. Y.

141 MILK ST., BOSTON

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*PROMPT DELIVERIES*



**CORDEAU  
BICKFORD  
SAFETY  
DETONATING  
FUSE**

*Cordeau was used to detonate the explosive in this  
400,000-ton blast.*

Cordeau-Bickford Detonating Fuse should be used wherever the well drill method of blasting is used. It adds from 10 to 20 per cent to the efficiency of the charge. Cordeau is safe. It's economical. It is practically instantaneous.

*May we send you the Cordeau booklet?*

**ENSIGN-BICKFORD COMPANY**

**Simsbury, Conn.**

# DECLARE YOUR INDEPENDENCE

of



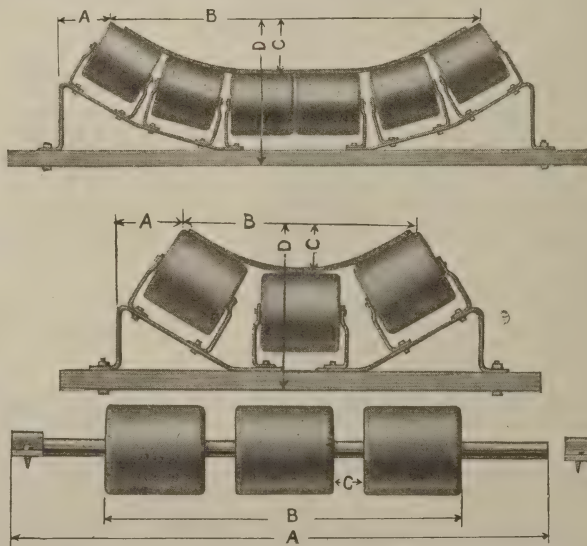
TROUBLESOME AND EXPENSIVE HAULING  
BY INSTALLING AN  
AUTOMATIC AERIAL TRAMWAY

*Send for Us*

**INTERSTATE EQUIPMENT CORPORATION**

25 Church Street

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**New  
Improved  
Conveyor**

**Self  
Lubricating**

**Unbreakable**

**B & W OIL-LESS CONVEYOR CO.**  
2416-20 OGDEN AVE. CHICAGO, ILL.



# General Motors Trucks



*GMC Heavy Duty Used in Hauling Gravel*

G.M.C. trucks are designed and built to meet hauling problems. Not only are they trucks of established and proved ability, but they are far in advance of the general trend of motor truck design in their features of construction which make far more economical operating costs and rapid and inexpensive replacements.

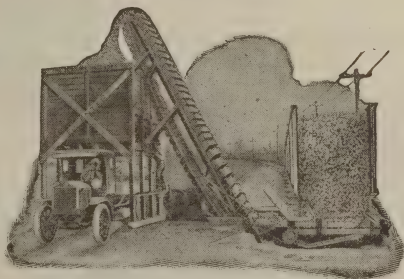
## GENERAL MOTORS TRUCK COMPANY

Division of General Motors Corporation  
PONTIAC, MICHIGAN

## Here's What We GUARANTEE

When equipped with proper size feeder, the SUNBURY Automatic Unloader

**Will load or unload a  
50-ton car in 90 minutes!**



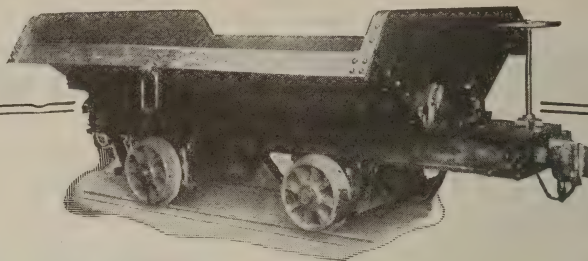
## *The* SUNBURY Automatic Unloader

And one man can handle it. The first cost is reasonable and its return from the standpoint of its being able to substantially increase your profits makes it a very profitable investment.

Its automatic feature is important and will commend it to you. It is simple in construction, strongly built and economical in operation.

*We will be pleased to send you an illustrated descriptive circular.*

**THE SUNBURY MANUFACTURING CO.**  
SUNBURY, OHIO



## QUARRY CARS THAT ENDURE

**Under Most Abusive Loading Conditions**

ATLAS CARS are designed to reduce haulage costs and last longer

*"They do both—Why not Investigate"*

Engineering Service Especially Developed in Quarry Car Design

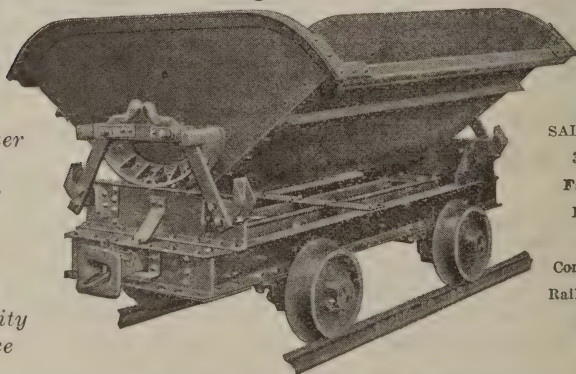
**THE ATLAS CAR & MFG. CO.**

**CLEVELAND, OHIO**

*Quarry Cars, Rocker and Gable Bottom Cars, Special Cars of All Kinds*



## KOPPEL QUARRY CARS



*Built Better  
They're  
Stronger  
Live  
Longer  
  
Rugged  
Serviceability  
Endurance*

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Toronto, Canada  
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WRITE FOR OUR BULLETIN

**KOPPEL INDUSTRIAL CAR & EQUIPMENT COMPANY**  
**KOPPEL, PA.**



# PORTER LOCOMOTIVES



The Zanesville Washed Gravel Company of Zanesville, Ohio, use the above locomotive, a 9-ton Porter, to haul 2 loaded cars of 10 tons each, up a  $3\frac{1}{2}\%$  grade.

© 1914 P. C.

are chosen by wise buyers that want year in and year out service.

*Ask for bulletin No. 103*

**H. K. PORTER COMPANY**  
**PITTSBURGH, PENNA.**

## BEHIND EVERY RELAYING RAIL

FOSTER'S QUALITY GUARANTEE  
FOSTER'S SERVICE GUARANTEE



30% to 50% below  
price of new rails.

Shipped subject to inspection  
and approval at destination.

1 Ton or 1000.

L. B. FOSTER CO., Inc.  
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WAREHOUSE: PITTSBURGH, PHILADELPHIA, HARTFORD, C.T.

Phone, Wire, or Mail Inquiries  
Given Immediate Attention

Relaying Rails, New Rails,  
Frogs, Switches, Bolts,  
Nuts, Etc.

25,000 Tons in Stock



# Hayward Buckets



Any sand and gravel producer will find helpful information closely related to his own plant activities in pamphlet 607 on "Handling Sand and Gravel with Hayward Buckets."

*Write for your copy now*

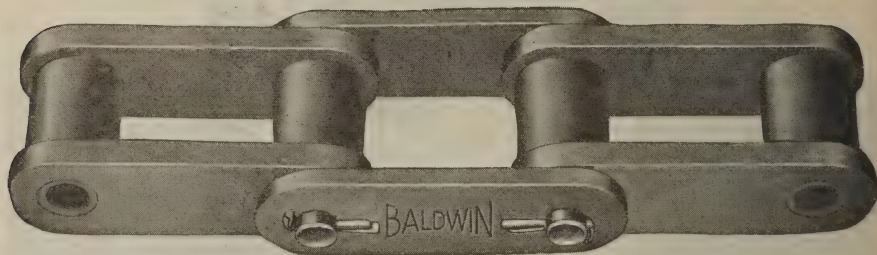
**The Hayward Company**  
50 Church Street, New York, N. Y.

*Clam Shell, Orange Peel, Drag Scraper and  
Electric Motor Buckets.*



*Hayward Buckets are ruggedly constructed and economical in upkeep. Cutting edges are equipped with replaceable steel shoes. All wearing surfaces are protected by easily renewable bearings and bushings.*

2907-Y



## Baldwin Chain Drives in Industry

The success of your business depends upon the many links in the manufacturing chain — and not the least of these is your Transmission and Conveying Problem.

It will surprise you to learn of the hundreds of installations

where Baldwin Chain Drive is proving its worth.

We manufacture Steel Roller Chain, Steel Block Chain, Malleable Detachable Chain, New Steel Replacement Series, Sprockets both Cut and Cast. Our Engineering Department is ready to help you solve your problem.

**THE BALDWIN CHAIN & MFG. CO.**  
**WORCESTER, MASS.**



Williams Special  
Dredging Bucket  
A heavy duty  
bucket, built  
with extra  
strength  
and rigidity.



Have you the  
WILLIAMS  
catalog? It  
shows working  
photos, blue-  
prints, and de-  
scribes each  
type of WIL-  
LIAMS Bucket.  
Write for Cata-  
log Q.

## Put a WILLIAMS on the job and be "entirely satisfied"

"We are entirely satisfied with our WILLIAMS Buckets, both for steady service and low cost of upkeep," writes R. J. James, Secretary, Brookfield Quarry & Towing Co., Astoria, Oregon.

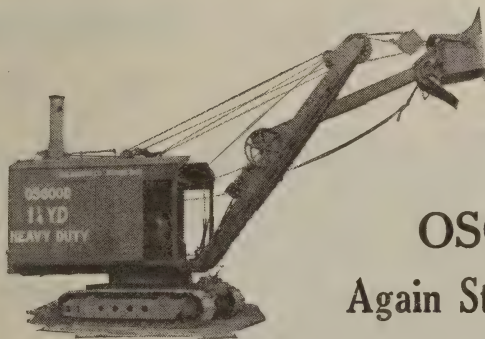
Whenever you have clamshell work to do, get the bucket that is designed to handle that work— one of the 12 types of buckets in the complete WILLIAMS line.

25 years of experience have shown us how to build buckets that we can guarantee will give you the output you need. All parts are guaranteed against breakage as long as used on work we recommend them for.

G. H. WILLIAMS CO., Erie, Pa., U. S. A.

# WILLIAMS

QUICK-ACTING CLAMSHELLS  
All Parts Guaranteed Against Breakage



## OSGOOD Again Steps Forward

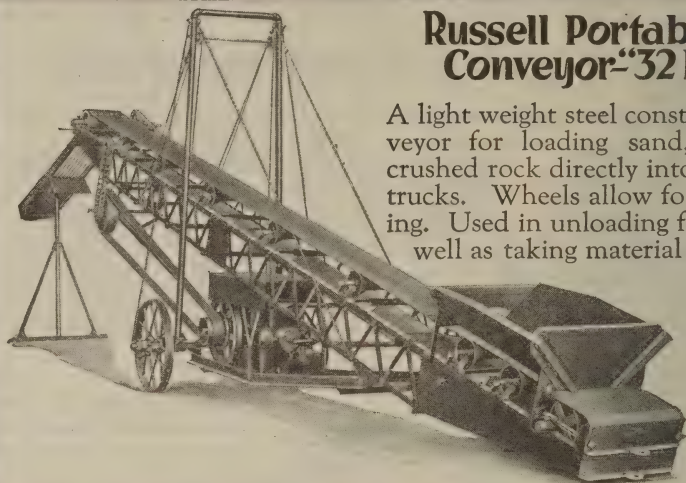
to meet the demand for a Revolving Steam Shovel of greater capacity. The new OSGOOD 1 1/4 yd. Heavy Duty now on the market meets this demand. Designed for Heavy Duty work, yet so constructed that speed, simplicity and ease of operation are in no way impaired. This machine must be seen to be fully appreciated.

Ask for Bulletin 236

3/4—1—1 1/4 yd. Revolving Steam Shovels, Clamshells and Draglines.

1 1/2 to 6 yd. Railroad Type Steam Shovels

The OSGOOD Company  
Marion, Ohio



## Russell Portable Conveyor—32 Foot

A light weight steel constructed conveyor for loading sand, gravel or crushed rock directly into wagons or trucks. Wheels allow for easy moving. Used in unloading from cars as well as taking material out of pits.

Russell Equipment also includes Drag Lines, Self Loading Buckets, Conveyors, Crushers and Bins. Ask for catalogue—Sent free and postpaid.

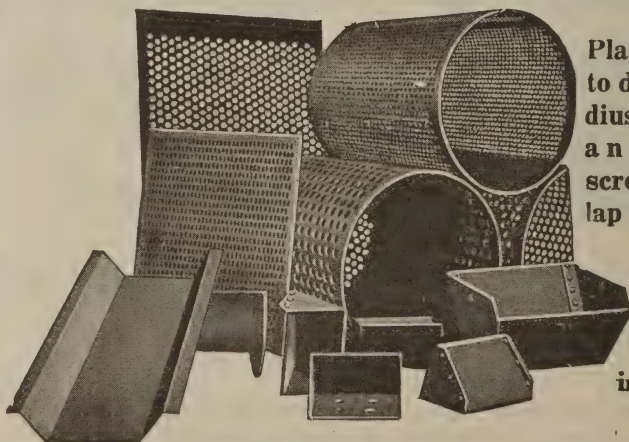
**RUSSELL GRADER MFG. CO.,** Factory and General Offices: Minneapolis, Minn.

*Affiliated plants—Cicero Ill., North Kansas City, Mo., Memphis, Tenn., Dallas, Tex.—  
Representatives in all principal cities.*

# RUSSELL

ROAD EQUIPMENT

## Perforated Metal Screens FOR STONE, SAND, GRAVEL, ETC.



Plates flat; rolled to diameter or radius for revolving and conical screens butted or lap joints.

## Elevator Buckets

in all styles and sizes

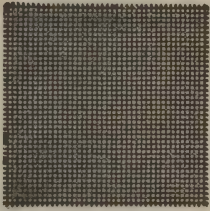
**HENDRICK MFG. CO.,**

30 Church St., New York City

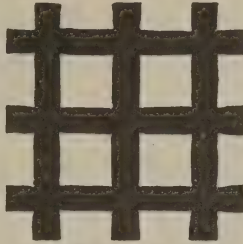
39 Dundaff Street  
CARBONDALE, PA.

544 Union Trust Bldg., Pittsburgh, Pa.

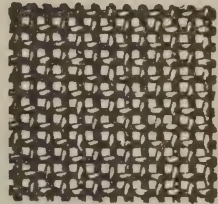




40 Mesh; .0135 Wire



2 1/2 Mesh; .105 Wire



12 Mesh; .047 Wire

**SERVICE!** is the one thought behind every operation in the manufacture of—

## “CLEVELAND” Double-Crimped Wire Cloth

Uniform fineness and long service will be assured by its use in screening SAND, GRAVEL, CRUSHED STONE AND CEMENT.

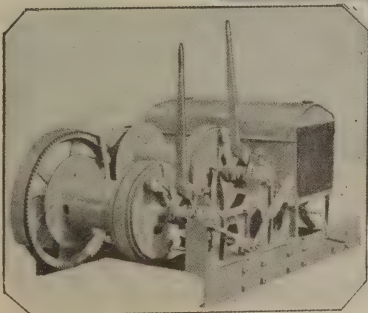
Large stock always on hand; special mesh manufactured to suit requirements at right prices.

**THE CLEVELAND WIRE CLOTH & MFG. CO.**

3579 EAST 78TH STREET  
CLEVELAND, OHIO

## You're Sure of Efficiency with Ebel Hoisting Engines

Heller Bros. of Lansing, Michigan have found Ebel Hoisting Engines most efficient in their work. Two are in use, turning out 800 yds. of material daily.



Ebel Hoisting Engines are especially designed for dragline work. They have a wide range of speed and are easily operated. They are built in three sizes 15-25-35 H.P. using either gasoline or electric motors.

Write today for catalogue.

**Lansing Motor & Pump Co., Inc.**  
LANSING MICH.

## Taylor's Spiral Riveted Pipe

The pipe line shown in this picture is made up entirely of Taylor's Spiral Riveted Pipe.

It is installed at the plant of the New Inland Gravel Company of Hattiesburg, Miss.

Taylor's Spiral Riveted Pipe is light, strong, durable and easily installed. It is cut to exact lengths, fitted throughout with forged steel flanges or other connections and fittings as required.

Send for our catalog and special net prices.

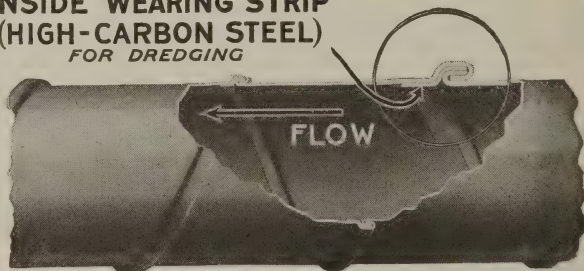
**AMERICAN SPIRAL PIPE WORKS**  
Box 485, Chicago, Ill.

## NAYLOR *Lock-Seam* SPIRAL PIPE

represents, without a doubt, the greatest advance in the manufacture of spiral pipe in many years.

It is formed of one continuous strip of very tough Skelp Steel, and is made absolutely water and air tight without the aid of rivets or the use of pipe coating.

**INSIDE WEARING STRIP  
(HIGH-CARBON STEEL)  
FOR DREDGING**



The secret is in the Lock Seam, which is illustrated herewith. This construction, which is reinforced with a High Carbon Spring Steel Wearing Strip, gives our dredging pipe double the life of any other.

If you are interested, we will be pleased to send you, at our expense, a small section of 12-inch, No. 10 gauge steel pipe; it will demonstrate to you the serviceability and economy of our Lock Seam construction.

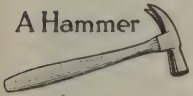
**ROBERTSON BROS. MFG. CO.**

5401 So. Western Blvd.

**CHICAGO, ILL.**



A Hammer



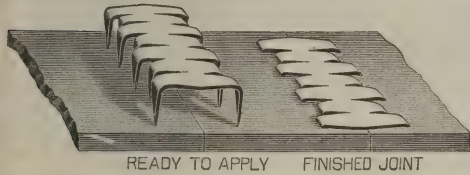
A Piece of Soft Wood



TRADE MARK  
**BRISTOL'S**  
REG. U. S. PAT. OFFICE.

The application of Bristol's Patent Steel Belt Lacing is so simple that these are the only tools needed.

With one blow of the hammer and the wedged-shaped points are driven straight thru the fibers of the belt without tearing them—a few more taps and the lacing is clinched so that it lays almost as flat and smooth as the belt itself.



**THE BRISTOL COMPANY**  
WATERBURY, CONN.

Boston  
Detroit

New York  
Chicago

Philadelphia  
St. Louis

Pittsburgh  
San Francisco

# Ellicott Machine Corporation



Fig. 282—Sand & Gravel  
Dredge

*Send for Bulletin 2091*

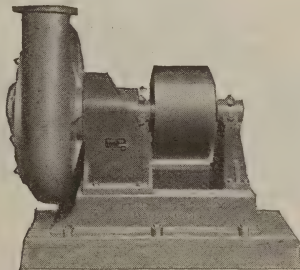
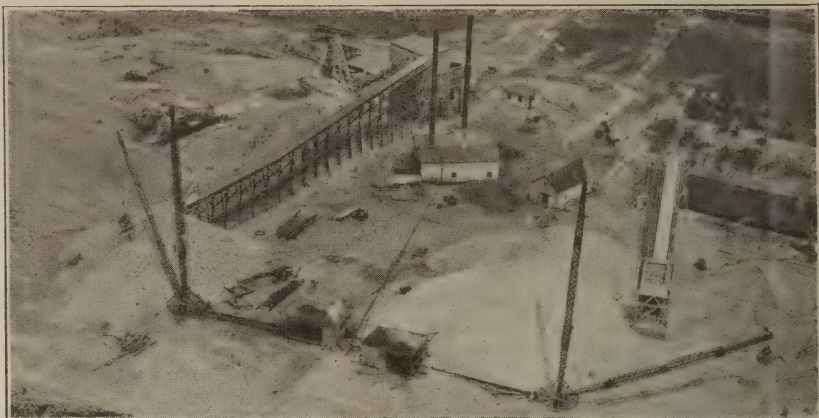


Fig. 281—Dredging Pump

*Send for Bulletin 2081*

**Baltimore, Maryland, U. S. A.**



## CUTTING COSTS WITH DOBBIE DERRICKS

This is just what the Boonville Sand and Gravel Co. is doing by using two Dobbie Derricks for excavating and conveying material.

Dobbie Derricks are unusually suited for Quarry Work as they combine light

weight with strength, enabling them to work efficiently and be easily moved from place to place.

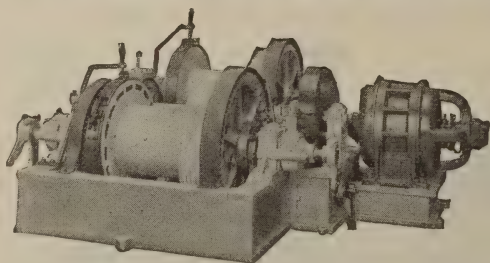
In many plants Dobbie Derricks can be used with great economy. Let us advise you regarding Dobbie Derricks in your plant.

**DOBBIE FOUNDRY & MACHINE CO.**

NIAGARA FALLS, NEW YORK

## LIDGERWOOD HOISTS

STEAM—ELECTRIC—BELT DRIVE—GASOLINE



*Types to suit all  
contractors' uses*

Illustration shows our Two-Speed Electric Hoist, built in sizes up to 200 H.P., for operating slack line drag bucket excavators up to and exceeding two-yard capacity.

A breakdown of the engine stops your entire operation; reduces your output; increases your cost per yard. *LIDGERWOOD HOISTS* have strength in every part to work continuously without break downs.

**HOISTS — CABLEWAYS — DERRICKS**

**LIDGERWOOD MFG. CO.**

96 Liberty Street, New York

Chicago  
Philadelphia

Cleveland  
London, Eng.

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Seattle



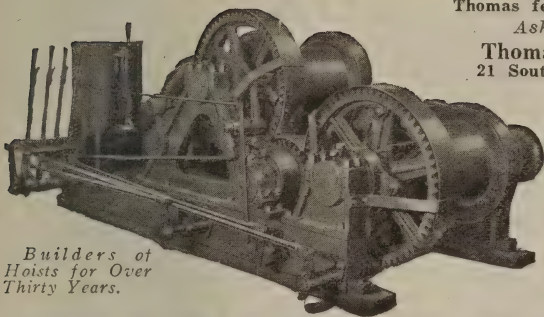
## Specialized Hoists for Sand and Gravel

The Thomas Two-Speed Electric Slack-line Cableway Hoist is an ideal hoist for sand and gravel.

The two-speed device is so designed that it keeps pulling in the slow speed until the high speed takes effect; the shift from low to high, and vice-versa, can be made without stopping the rotation of the drums. This is an exclusive Thomas feature.

Ask for Bulletin No. 33

Thomas Elevator Company  
21 South Hoyne Avenue, Chicago



Builders of  
Hoists for Over  
Thirty Years.

# THOMAS HOISTS

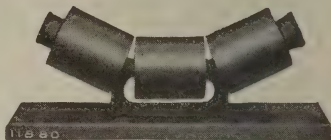


**BEACH**  
Bottomless  
**BUCKET**  
operated  
with  
**Double Drum**  
**Gasoline**  
**Hoist**

It will remove gravel from below the surface of the water equally as well as from a dry bank, and is also very efficient in stripping the soil from the top of gravel pits, excavating cellars and working marl deposits. Where it is unnecessary to screen the gravel it can be used to load the gravel or other material directly into wagons or trucks. One man will move as much material as three teams and six men can move with scrapers.

**BEACH MFG. CO.**

**Charlotte, Mich.**



## CONVEYOR ACCESSORIES



Insure the continuous working of your Elevating, Conveying and Power Transmission Machinery, by keeping spare parts constantly on hand.

Be prepared for increased business by having all your equipment up to its most efficient working order.



Replace that bucket or chain now—make that extension to your plant that you have been thinking about—now!



### H. W. CALDWELL & SON CO.

LINK-BELT COMPANY, OWNER

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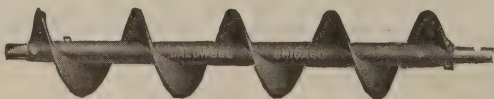
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H. W. CALDWELL & SON CO., CHICAGO

NEW YORK, Woolworth Bldg.

# CALDWELL







## For Speed—The Link-Belt Crawler Crane

(Janesville Sand & Gravel Co., Janesville, Wis.)

In daily continuous service, with a 1 cu. yd. capacity grab bucket handling sand and gravel, swinging on an average of 120 degrees, hoisting about 35 feet, and consuming but 21 gallons of gasoline, this Link-Belt Crawler Crane makes from 90 to 100 trips an hour.

The incline on which this crane is shown operating is from 15 to 25° per cent. Yet the construction of travel me-

chanism absolutely prevents involuntary movement.

Three elements characterize Link-Belt Crawler Cranes. One, the rugged construction; another, the simplicity of operation; and third, the unusually low maintenance cost.

Let us tell you where you can see a Link-Belt Crawler Crane in operation. Send for complete specifications.

### LINK-BELT COMPANY

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Buffalo . . . . . 743 Elliott Square . . . . .

Link-Belt Ltd., Toronto and Montreal

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CHICAGO NEW YORK, Woolworth Bldg.

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820 First Ave. S. . . . .  
101 First St. . . . .  
165 Second St. . . . .  
183 No. Los Angeles St. . . . .  
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DALLAS, TEXAS, 709 Main St.

# LINK-BELT

# Measuring Worthington Crusher Experience 1904-1922

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| 1922 |
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| 1918 |
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| 1904 |



Worthington's gyratory crusher experience started in 1904 with the first No. 10 Standard McCully that ever was built.

In 1909 Worthington began testing a new gyratory—the Superior McCully—and for three years the work went on, until in 1912 the improved crusher was placed on the market.

It takes little time to tell about this development, but the eighteen years spent making gyratory crushers brought to Worthington experience, which is one of the most important things that can be put into crusher construction.

## WORTHINGTON PUMP AND MACHINERY CORPORATION

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